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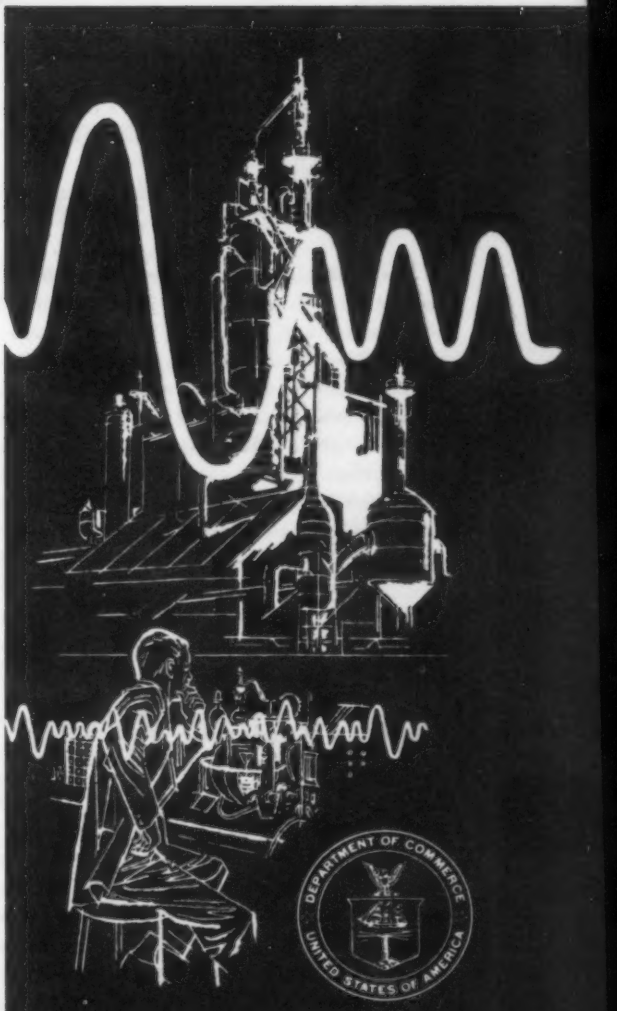

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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CONTENTS

PAGE NOS.

NOTICE TO READERS OF THIS BULLETIN ..... Inside Front Cover

SUBJECT INDEX NI-1

SUBJECT DIVISIONS

1 AIRCRAFT AND FLIGHT EQUIPMENT 1
2 ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY 1
3 CHEMICAL WARFARE EQUIPMENT AND MATERIALS ... 5
4 CHEMISTRY 5
5 COMMUNICATIONS 7
6 DETECTION 8
7 ELECTRICAL EQUIPMENT 10
8 ELECTRONICS AND ELECTRONIC EQUIPMENT 11
9 FLUID MECHANICS 19
10 FUELS AND COMBUSTION 20
11 GROUND TRANSPORTATION EQUIPMENT ..... No Entries
12 GUIDED MISSILES 23
13 INSTALLATIONS AND CONSTRUCTION 24
14 MATERIALS (NON-METALLIC) 25
15 MATHEMATICS 29
16 MEDICAL SCIENCES 32
17 METALLURGY 34
18 MILITARY SCIENCES AND OPERATIONS 37
19 NAVIGATION ..... No Entries
20 NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY 38
21 NUCLEAR PROPULSION ..... No Entries
22 ORDNANCE 40
23 PERSONNEL AND TRAINING 42
24 PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES 42
25 PHYSICS 44
26 PRODUCTION AND MANAGEMENT 52
27 PROPULSION SYSTEMS 53
28 PSYCHOLOGY AND HUMAN ENGINEERING 54
29 QUARTERMASTER EQUIPMENT AND SUPPLIES 57
30 RESEARCH AND RESEARCH EQUIPMENT 57
31 SHIPS AND MARINE EQUIPMENT 61
32 MISCELLANEOUS ARTS AND SCIENCES 61
33 TRANSPORTATION 63

CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

	Page
AGRICULTURE	S-1
ASTRONOMY	S-1
BEHAVIORAL SCIENCES	S-2
BIOLOGICAL SCIENCES	S-3
CHEMISTRY	S-8
EARTH SCIENCES	S-10
ENGINEERING	S-12
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-25
MATERIALS	S-26
MATHEMATICS	S-28
MECHANICS	S-28
METALLURGY	S-31
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-34
PHYSICS	S-46
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	S-50
SOCIAL SCIENCES	S-50
MISCELLANEOUS	S-51
AD INDEX	S-53
NUMBER INDEX	S-55
SUBJECT INDEX	S-57

This issue includes:

TAB 62 - 3 - 6

AD 276 500 - AD 276 999

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SUBJECT INDEX

ACCELERATORS

STRUCTURAL FEASIBILITY OF FLYWHEELS TO BE USED AS CENTRIFUGAL ACCELERATORS.
AD-276 968 DIV. 30

TECHNIQUES UTILIZING HALL GENERATORS IN MEASURING PRECISION MAGNETIC FIELDS IN ACCELERATORS. INDIUM ARSENIDE AND ANTIMONIDE SEMICONDUCTORS; HALL EFFECT; RESISTANCE; DESIGN.
AD-276 737 DIV. 25

ACETYLENES

KETENE; GROUND STATE O ATOMS PRODUCED BY THE PHOTOLYSIS OF N2O REACT WITH ACETYLENE TO PRODUCE KETENE.
AD-276 563 DIV. 4

ACHIEVEMENT TESTS

DEVELOPMENT OF NEW FORMS OF TWO ACB TESTS: THE AUTOMOTIVE INFORMATION TEST AND THE ARMY CLERICAL SPEED TEST. STANDARDIZED AGAINST WWII ARMY POPULATION IN MENTAL ABILITY: AI-3 AND AI-4 SUFFICIENTLY RELIABLE, AND DIFFERENTIATED FROM VERBAL TEST. ACS-3 AND ACS-4 RELIABLE, YET SUBSTANTIALLY SHORTER.
AD-276 622 DIV. 26

ACOUSTIC IMPEDANCE

THE INTERACTION MECHANICAL RADIATION IMPEDANCE BETWEEN TWO PISTONS ARBITRARILY ORIENTED IN SPACE WITHOUT A BAFFLE.
AD-276 658 DIV. 25

AERIAL CAMERAS

ADAPTATION OF THE KB-14A AND P-220 CAMERAS FOR USE IN HIGH ALTITUDE BALLOON AND ROCKET VEHICLE PHOTOGRAPHY IS REPORTED.
AD-276 663 DIV. 24

AERIAL PHOTOGRAPHY

ITHE USE OF ADDITIVE COLOR PHOTOGRAPHY TO INCREASE THE PHOTO INTERPRETABILITY OF AERIAL PHOTOGRAPHY IS STUDIED.
AD-276 687 DIV. 24

AERIAL RECONNAISSANCE

A DETAILED ANALYSIS IS PRESENTED OF ELECTRONIC CORRELATION TECHNIQUES FOR CHANGE DETECTION.
AD-276 746 DIV. 24

AERODYNAMIC CONFIGURATIONS

NOSE AND INLET SHAPES OF MINIMUM DRAG IN SUPERSONIC FLOW.
AD-276 819 DIV. 9

AIR

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD.
AD-276 910 DIV. 9

AIR DROP OPERATIONS

AN ANALYSIS OF THE MEANS OF AIR-LAYING WIRES AND CABLES WITH SUFFICIENT SLACK.
AD-276 618 DIV. 5

AIR FORCE LOGISTICS

WEAPON SYSTEM CONCEPT: DEFINITION AND HISTORICAL EVOLUTION: INSTRUMENTATION.
AD-276 558 DIV. 18

AIR FORCE OPERATIONS

WEAPON SYSTEM CONCEPT: DEFINITION AND HISTORICAL EVOLUTION: INSTRUMENTATION.
AD-276 558 DIV. 18

AIR TRAFFIC CONTROL SYSTEMS

DESIGN STUDY OF SIMPLE, LIGHTWEIGHT ANALOGUE DEVICES TO IMPROVE THE OPERATIONAL PERFORMANCE OF MOBILE USAF RADAR APPROACH CONTROL (RAPCON) FACILITIES.
AD-276 719 DIV. 30

AIRCRAFT

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION: WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

AIRCRAFT FIRE CONTROL SYSTEMS

TRACKING TESTS WITH HELICOPTER FIRE CONTROL SYSTEM MOUNTED IN XH1 HELICOPTER: STABILIZED SIGHTING SYSTEM; TRACKING ERROR AVERAGED APPROXIMATELY 2 MILS RMS. SIGNALS OBTAINED FROM AIRCRAFT NAVIGATIONAL EQUIPMENT.
AD-276 549 DIV. 6

AIRFRAMES

DISCUSSION OF STRUCTURAL DESIGN REQUIREMENTS AND ANALYSIS OF ROCKETS; MISSILES, AND SPACECRAFT IS REPORTED.
AD-276 878 DIV. 12

ALBEDO (ASTRONOMY)

ENVIRONMENTAL CONTROL FOR SPACE VEHICLES. ANALYSIS OF DIRECT SOLAR RADIATION: PLANETARY ALBEDO: AND PLANETARY THERMAL RADIATION FOR SPHERICAL, HEMISPHERICAL, CYLINDRICAL AND FLAT PLATES: AND OF INTERNAL HEAT LOADS.
AD-276 859 DIV. 12

ALGAE

COMPARISONS OF SOME ASPECTS OF THE METABOLISM OF WILD TYPE CHLAMYDOMONAS MOEWUSII WITH A PARALYZED STRAIN OF THE SAME SPECIES WERE STUDIED.
AD-276 629 DIV. 16

LIGHT INTENSITY AND AGITATION IN CHLORELLA CULTURES. A MATHEMATICAL MODEL FOR PHOTOSYNTHESIS. ENGINEERING CONSIDERATIONS FOR A CONTINUOUS CULTURE. 30 REFERENCES.
AD-276 897 DIV. 16

ALLOYS

THE EFFECT OF ORDER-DISORDER TRANSFORMATIONS ON THE STRENGTH OF METALS AND ALLOYS AT ELEVATED TEMPERATURES.
AD-276 947 DIV. 17

MECHANICAL PROPERTIES OF A-286 AND 201476 ALLOYS AT ROOM TEMPERATURE, -110 AND -320 F.
AD-276 983 DIV. 17

ALUMINUM

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION: WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

ALUMINUM ALLOYS

DESIGN AND FABRICATION ENGINEERING DATA ON 6061 ALUMINUM ALLOY. WELDING, HEAT TREATMENT AND EFFECTS OF CRYOGENIC TEMPERATURES ON MECHANICAL PROPERTIES.
AD-276 982 DIV. 17

ANALOG COMPUTER

DESIGN STUDY OF SIMPLE, LIGHTWEIGHT ANALOGUE DEVICES TO IMPROVE THE OPERATIONAL PERFORMANCE OF MOBILE USAF RADAR APPROACH CONTROL (RAPCON) FACILITIES.
AD-276 719 DIV. 30

ANALOG SIMULATION OF FREQUENCY RESPONSE TECHNIQUES FOR NONLINEAR SERVOMECHANISMS.
AD-276 695 DIV. 30

ANEMOMETERS

THE FORCED CONVECTION HEAT LOSS FROM LONG THIN CYLINDERS PLACED NORMAL TO AN INCOMPRESSIBLE FLOW IS STUDIED.
AD-276 530 DIV. 25

ANTARCTIC REGIONS

THE ANTARCTIC ICE SHEET.
AD-276 609 DIV. 2

ANTENNA HORNS

A GREGORIAN CORRECTOR FOR SPHERICAL REFLECTORS.
AD-276 972 DIV. 8

ANTENNA RADIATION PATTERNS

TWO ANTENNAS WHICH GIVE DIRECTIONAL PATTERNS WHICH CAN BE POINTED TO ANY AZIMUTH ANGLE BY ELECTRONIC MEANS: CONCENTRIC RINGS OF DIPOLES: AND CONCENTRIC LOOPS.
AD-276 951 DIV. 8

TIME MODULATION OF ARRAY ANTENNAS WAS APPLIED TO THE PROBLEMS OF OBTAINING ULTRA-LOW SIDELOBE AND SIMULTANEOUSLY SCANNED ANTENNA PATTERNS.
AD-276 699 DIV. 8

ANTENNAS

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 936 DIV. 2

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

A FLAT DIELECTRIC PLATE PLACED IN FRONT OF AN ANTENNA APERTURE INCREASES THE POWER GAIN OF THE APERTURE WITHOUT INCREASING THE PHYSICAL AREA. THE GAIN CAN BE FURTHER INCREASED BY MOVING A SINGLE OR DOUBLE DIELECTRIC PLATE ARRAY GRADUALLY AWAY FROM THE APERTURE.
AD-276 688 DIV. 8

INVESTIGATIONS ON BROADBAND ANTENNAS: AND HIGH RESOLUTION ANTENNA TECHNIQUES.
AD-276 894 DIV. 8

APTITUDE TESTS

DEVELOPMENT OF NEW FORMS OF TWO ACB TESTS: THE AUTOMOTIVE INFORMATION TEST AND THE ARMY CLERICAL SPEED TEST. STANDARDIZED AGAINST WWII ARMY POPULATION IN MENTAL ABILITY: AI-3 AND AI-4 SUFFICIENTLY RELIABLE, AND DIFFERENTIATED FROM VERBAL TEST. ACS-3 AND ACS-4 RELIABLE; YET SUBSTANTIALLY SHORTER.
AD-276 622 DIV. 26

ARGON

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

ELECTRON DENSITY AND COLLISION FREQUENCY OF ARC-HEATED ARGON PLASMA.
AD-276 909 DIV. 9

HIGH TEMPERATURE POLYMERS: PHOSPHONITRILE RING OPENING STUDIES, POLYMERIZATION SYNTHESIS. IR ATOMIC SPECTRA AR, HE, GE. LASER PROGRAM. NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 920 DIV. 25

ARMING DEVICES

SUMMARY OF A RESEARCH AND DEVELOPMENT PROGRAM ON THE DESIGN: DEVELOPMENT AND FABRICATION OF ELECTRONIC SOLID STATE ARM SAFE DEVICES FOR ARMY MISSILE WARHEAD.
AD-276 898 DIV. 22

ARMY OPERATIONS

PROJECT COMET A PROJECT TO DEVELOP A COMPUTER-OPERATED MANAGEMENT EVALUATION TECHNIQUE FOR SIGNAL CORPS PROCUREMENT.
AD-276 938 DIV. 26

ARTIFICIAL PRECIPITATION

EXPERIMENTS IN CLOUD DISSIPATION FOR MODIFICATION OF GREENLAND WHITEOUTS.
AD-276 608 DIV. 2

ARTILLERY FIRE

ESTIMATES OF THE EFFECT OF RAIN: CLOUDS: AND VERTICAL WIND ON ARTILLERY FIRE ARE GIVEN: AN EXAMPLE BASED ON THE MAX RANGE OF THE 105MM HOWITZER IS PRESENTED.
AD-276 637 DIV. 22

ATMOSPHERE

WAVES ALONG HOMOGENEOUS PLASMA LAYERS.
AD-276 905 DIV. 25

ATMOSPHERIC SOUNDING

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 936 DIV. 2

ATOMIC ENERGY LEVELS

HIGH TEMPERATURE POLYMERS: PHOSPHONITRILE RING OPENING STUDIES. POLYMERIZATION SYNTHESIS.

IR ATOMIC SPECTRA. AR; HF; GE. LASER PROGRAM, NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 980 DIV. 25

*ATOMIC SPECTRUM

THE EFFECTS OF INERT GASES ON THE SPECTRAL CHARACTERISTICS OF ARC DISCHARGES.
AD-276 803 DIV. 25

*ATOMS

AN ULTRASONIC CW SPECTROMETER FOR THE INVESTIGATION OF ELECTRON SPIN-PHONON INTERACTIONS IN SOLIDS.
AD-276 960 DIV. 25

*ATTITUDES

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 28

*AURORAE

EXCITATION OF NITRIC OXIDE AND ATOMIC OXYGEN IN AFTERGLOW SOURCES.
AD-276 626 DIV. 25

*AVIATION SAFETY

AIRCRAFT PROTECTION FROM THUNDERSTORM ELECTROMAGNETIC EFFECTS - FIN CAP AND RADOME ANTENNA SYSTEM.
AD-276 641 DIV. 1

*BACKWARD-WAVE AMPLIFIERS

A LINEAR THEORY IS DEVELOPED FOR TRAVELING-WAVE TUBES WHICH IS BASED UPON A PERIODIC MODEL FOR THE SLOW-WAVE STRUCTURE.
AD-276 730 DIV. 8

*BACKWARD-WAVE OSCILLATORS

A LINEAR THEORY IS DEVELOPED FOR TRAVELING-WAVE TUBES WHICH IS BASED UPON A PERIODIC MODEL FOR THE SLOW-WAVE STRUCTURE.
AD-276 730 DIV. 8

*BALL BEARINGS

THEORIES OF ELASTOHYDRODYNAMIC LUBRICATION ARE REVIEWED. CONTACT SHAPE MEASUREMENTS AND PRESSURE DISTRIBUTION DETERMINATION.
AD-276 837 DIV. 26

*BALLISTICS

A BALLISTICS RANGE STATION IDENTIFICATION SYSTEM TO BE USED IN CONJUNCTION WITH A DATA RECORDER-REPRODUCER; FINAL READOUT IS PRESENTED VISUALLY AND IS AUTOMATICALLY PRINTED OUT BY A FLEXOWRITER.
AD-276 910 DIV. 30

*BAND-PASS FILTERS

DESIGN EXPRESSIONS FOR CRITICALLY COUPLED, BILATERALLY MATCHED FILTERS AT MICROWAVE FREQUENCIES.
AD-276 908 DIV. 8

*BARIUM COMPOUNDS

MANUFACTURING METHODS FOR LARGE SCALE PRODUCTION OF HIGH PURITY FERROELECTRIC OR PIEZOELECTRIC MATERIALS SUCH AS TITANATES; ZIRCONATES; NIOBATES; AND TANTALATES.
AD-276 888 DIV. 14

*BEAMS

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME, KNEE TYPE, STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 687 DIV. 13

*BEARING FINDING

RADIO DIRECTION FINDING OVER A TROPOSCATTER PATH; FLUCTUATIONS IN BEARING ESTIMATES OF A MICROWAVE INTERFEROMETER AT 910 MC WITH THE TRANSMITTER LOCATED BEYOND THE HORIZON.
AD-276 907 DIV. 6

*BEHAVIOR

PAPERS ARE PRESENTED ON THE APPLICATION OF MULTIVARIATE METHODS TO SUBSTANTIVE PROBLEMS. OTHER PAPERS ARE ON LOGIC AND MATHEMATICS. THE PROBLEMS DISCUSSED ARE MAINLY IN THE AREA OF BEHAVIOR AND PERSONALITY TESTING.
AD-276 667 DIV. 28

TRACKING TASKS AS ACCURATE INDICATORS OF STRESSES ON HUMAN BEINGS.
AD-276 678 DIV. 28

STUDIES WERE CONDUCTED ON MEASURABLE DIMENSIONS OF GROUP STRUCTURE AND THEIR RELATIONS TO GROUP BEHAVIOR.
AD-276 828 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. V. ORGANIZATIONAL MANAGEMENT AND LEADERSHIP.
AD-276 831 DIV. 28

*BERYLLIUM

THE EFFECTS OF BE ABSORPTION ARE DESCRIBED; SPECIFIC MEASURES DESIGNED TO PREVENT ILLNESS AND MAINTAIN HEALTH AMONG PERSONS WORKING WITH BE ARE GIVEN- MEDICAL PROGRAM; BIBLIOGRAPHY.
AD-276 640 DIV. 16

A BIBLIOGRAPHY OF BERYLLIUM FOR AUGUST-DECEMBER 1961. 309 REFERENCES.
AD-276 716 DIV. 17

*BERYLLIUM COMPOUNDS

A BIBLIOGRAPHY OF BERYLLIUM FOR AUGUST-DECEMBER 1961. 309 REFERENCES.
AD-276 716 DIV. 17

*BERYLLIUM POISONING

THE EFFECTS OF BE ABSORPTION ARE DESCRIBED; SPECIFIC MEASURES DESIGNED TO PREVENT ILLNESS AND MAINTAIN HEALTH AMONG PERSONS WORKING WITH BE ARE GIVEN- MEDICAL PROGRAM; BIBLIOGRAPHY.
AD-276 640 DIV. 16

*BETATRONS

THE COMPUTATION OF THE MOTION OF ELECTRONS IN A BETATRON WITH AN INCREASING TOROIDAL MAGNETIC FIELD.
AD-276 902 DIV. 20

*BIBLIOGRAPHY

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS; PLASTICS; SYNTHETIC FIBERS; ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 621 DIV. 14

ABSTRACTS OF TECHNICAL REPORTS PUBLISHED BY THE DIRECTORATE OF MATERIALS AND PROCESSES.
AD-276 709 DIV. 14

A BIBLIOGRAPHY OF BERYLLIUM FOR AUGUST-DECEMBER 1961. 309 REFERENCES.
AD-276 716 DIV. 17

APPROACHES TO THE ANALYSIS OF SOCIOMETRIC DATA. A SURVEY OF THE LITERATURE.
AD-276 827 DIV. 28

STUDIES WERE CONDUCTED ON MEASURABLE DIMENSIONS OF GROUP STRUCTURE AND THEIR RELATIONS TO GROUP BEHAVIOR.
AD-276 828 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. V. ORGANIZATIONAL MANAGEMENT AND LEADERSHIP.
AD-276 831 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. LEADERSHIP IN FORMAL GROUPS.
AD-276 832 DIV. 28

BIBLIOGRAPHY ON THE THERMOMAGNETIC AND GALVANOMAGNETIC PROPERTIES AT TEMPERATURES UP TO 300 K OF SEMICONDUCTORS AND SEMIMETALS.
AD-276 871 DIV. 17

A BIBLIOGRAPHY OF HIGH PRESSURE TECHNIQUES AND PHENOMENA, CHEMICAL AND PHYSICAL. CRYSTAL GROWTH IN SOLUTIONS AT HIGH TEMPERATURE AND PRESSURE. OVER 2,000 REFERENCES.
AD-276 941 DIV. 25

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

*BIOPHYSICS

EXPERIMENTS DONE IN THE USSR ON THE PROSTHESIS OF THE ARM WITH BIOELECTRIC CONTROL.
AD-276 927 DIV. 16

*BISMUTH

ELECTRICAL PROPERTIES OF SELENIUM WITH ADMIXTURE OF BISMUTH.
AD-276 707 DIV. 25

*BLUNT BODIES

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND REshotko METHOD.
AD-276 910 DIV. 9

*BORON

THE EFFECT OF BORON-10 SHIELDS ON THE CALIBRATION OF NEUTRON-THRESHOLD DETECTORS.
AD-276 926 DIV. 20

REACTION OF ELEMENTAL BORON AND FLUORINE GAS.
AD-276 988 DIV. 10

*BOUNDARY LAYER

MEASUREMENTS OF THE CORRELATION BETWEEN THE FLUCTUATING VELOCITIES AND THE FLUCTUATING WALL PRESSURE IN A THICK TURBULENT BOUNDARY LAYER.
AD-276 901 DIV. 9

ON A MIXED BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES.
AD-276 884 DIV. 15

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 874 DIV. 9

*CAMERA TUBES

INVESTIGATION ON TRANSMISSIVE SECONDARY EMISSION FILMS AND THEIR APPLICATIONS AS PRE-SCANNING BEAM AMPLIFIERS IN CAMERA TUBES IS SUMMARIZED.
AD-276 964 DIV. 8

*CARBON DIOXIDE

MEASUREMENT OF SOIL CARBON DIOXIDE AND ITS DIFFUSION INTO THE ATMOSPHERE.
AD-276 800 DIV. 32

*CARBONIC ACIDS

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX; BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION; TURBIDOMETRIC STUDIES; CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 6

*CATHODE RAY TUBES

RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IAMRON DIRECT VIEW STORAGE TUBES.
AD-276 897 DIV. 8

*CATHODES (ELECTROLYTIC CELL)

EFFECT OF METAL ADDITIVES ON THE HYDROGEN OVERVOLTAGE OF CU POLYCRYSTALLINE AND SINGLE CRYSTAL CATHODES, ADDITIVES - CD; AS; SB; AND IN.
AD-276 870 DIV. 6

*CENTRIFUGAL FIELDS

THE PRECESSION OF SPINNING BODIES DUE TO GRAVITATIONAL GRADIENT TORQUES.
AD-276 935 DIV. 25

*CERAMIC MATERIALS

MANUFACTURING METHODS FOR LARGE SCALE PRODUCTION OF HIGH PURITY FERROELECTRIC OR PIEZOELECTRIC MATERIALS SUCH AS TITANATES; ZIRCONATES; NIOBATES; AND TANTALATES.
AD-276 888 DIV. 14

*CHEMICAL BONDS

POLY(ETHYLENE TETRASULFIDE) POLYMERS: STRESS RELAXATION: SPECIFIC RATE CONSTANT FOR BOND INTERCHANGE: ACTIVATION ENERGY.
AD-276 991 DIV. 4

*CHEMICAL IMPURITIES

ELECTRICAL PROPERTIES OF SELENIUM WITH ADMIXTURE OF BISMUTH.
AD-276 707 DIV. 25

*CHINA

PRODUCTION: IMPORTS: AND CONSUMPTION OF PETROLEUM IN COMMUNIST CHINA 1949-1960. RESOURCES: COSTS: AND SOVIET TRADE POLICY IN PETROLEUM INDUSTRY DEVELOPMENT. 128 REFERENCES.
AD-276 532 DIV. 32

*CHLORIDES

POINT DEFECTS AND DISLOCATIONS IN SILVER CHLORIDE CRYSTALS.
AD-276 839 DIV. 25

*CLASSIFICATION

RESULTS SUPPORT THE VALIDITY OF THE CLASSIFICATION SYSTEM AS A MEANS FOR SYSTEMATIC ORGANIZATION OF SMALL GROUP RESEARCH INFORMATION.
AD-276 858 DIV. 28

A SUMMARY OF SMALL GROUP RESEARCH STUDIES.
AD-276 860 DIV. 28

*CLOUDS

THE INCORPORATION OF PHYSICAL PARAMETERS IN THE OBJECTIVE SPECIFICATION OF CLOUDINESS.
AD-276 942 DIV. 2

ESTIMATES OF THE EFFECT OF RAIN: CLOUDS: AND VERTICAL WIND ON ARTILLERY FIRE ARE GIVEN: AN EXAMPLE BASED ON THE MAX RANGE OF THE 105MM HOWITZER IS PRESENTED.
AD-276 837 DIV. 22

*COBALT

COBALT GLASS DOSIMETERS WERE USED TO MEASURE THERMAL NEUTRON FIELDS IN THE PRESENCE OF A FAST NEUTRON FIELD.
AD-276 862 DIV. 6

*CODING

EVALUATION OF A BURST-ERROR CORRECTION CODE ON A GILBERT CHANNEL.
AD-276 527 DIV. 8

*COLORIMETRIC ANALYSIS

THE POLARIZATION OF SUNLIGHT BY THE SEA SURFACE AT ANGLES OF INCIDENCE CLOSE TO THE BREWSTER ANGLE FOR THE LONG AND MEDIUM WAVELENGTHS OF THE SPECTRUM.
AD-276 738 DIV. 25

*COMBAT INFORMATION CENTERS

PROGRAMMING SYSTEM THAT MEETS THE REQUIREMENTS OF THE SPACE DETECTION AND TRACKING (SPADATS) SEMI-AUTOMATIC CENTER: PROGRAM DESCRIPTIONS: SPECIFICATIONS: AND FUNCTIONS.
AD-276 816 DIV. 30

*COMMUNICATION SYSTEMS

AN INVESTIGATION AND ANALYSIS OF DIGITAL DATA COMMUNICATION SYSTEMS.
AD-276 847 DIV. 5

TECHNIQUES FOR THE CONSTRAINED OPTIMIZATION OF COMMUNICATION NETS.
AD-276 916 DIV. 8

*COMMUNICATIONS THEORY

AN INFORMATION THEORY FOR THE TIME-CONTINUOUS PROCESSES.
AD-276 697 DIV. 8

*COMPLEX COMPOUNDS

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX: BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION: TURBIDOMETRIC STUDIES: CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 4

*COMPOSITE MATERIALS

THE DEFORMATION MECHANISM OF FIBER-REINFORCED METAL AND ALLOY COMPOSITE MATERIALS.
AD-276 680 DIV. 17

GLASS FABRIC FINISHES: REINFORCED PLASTICS - POLYESTER: PHENOLIC AND EPOXY RESINS: EFFECTIVENESS OF BONDING THE RESINS WITH CHLOROSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 686 DIV. 14

*COMPRESSED AIR

DEVICES FOR THE REMOVAL OF OIL AND MOISTURE FROM COMPRESSED AIR WERE TESTED.
AD-276 809 DIV. 13

*COMPRESSION SHOCK

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 876 DIV. 9

*COMPRESSORS

DEVICES FOR THE REMOVAL OF OIL AND MOISTURE FROM COMPRESSED AIR WERE TESTED.
AD-276 809 DIV. 13

*COMPUTERS

MATHEMATICAL PROGRAMMING: MAN-COMPUTER RESEARCH: AND SYSTEM CONTROL.
AD-276 919 DIV. 15

DYNAMIC SIMULATION OF A DISTILLATION COLUMN WITH A COMBINED ANALOG-DIGITAL COMPUTER.
AD-276 573 DIV. 4

ACTIVITIES OF THE COMPUTATION CENTER OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY ARE SUMMARIZED. WORK IN THE FIELD OF ARTIFICIAL INTELLIGENCE IS DISCUSSED.
AD-276 974 DIV. 30

COMPUTER SIMULATIONS OF A PERCEPTUAL LEARNING MODEL FOR SENSORY PATTERN RECOGNITION: CONCEPT FORMATION: AND SYMBOL TRANSFORMATION.
AD-276 703 DIV. 30

STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS.
AD-276 999 DIV. 30

*CONICAL ANTENNAS

INVESTIGATIONS ON BROADBAND ANTENNAS: AND HIGH RESOLUTION ANTENNA TECHNIQUES.
AD-276 894 DIV. 8

*CONICAL NOZZLES

SOURCE FLOW EFFECTS IN CONICAL HYPERVELOCITY NOZZLES ARE STUDIED BY MEANS OF A SIMPLE NEWTONIAN THEORY FOR SLENDER CONICAL BODIES.
AD-276 724 DIV. 30

*CONTROL SYSTEMS

OPTIMAL CONTROL OR UTILIZATION OF A SPECIFIED SYSTEM.
AD-276 934 DIV. 15

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 881 DIV. 7

STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS.
AD-276 999 DIV. 30

*CONTROL VALVES

A PRESSURE REGULATOR WAS ANALYZED TO DETERMINE WHY THE REGULATOR FLUCTUATED FROM THE NON-MODULATING TO THE MODULATING MODE.
AD-276 836 DIV. 26

*CONTROLLED ATMOSPHERES

ENVIRONMENTAL CONTROL FOR SPACE VEHICLES. ANALYSIS OF DIRECT SOLAR RADIATION: PLANETARY ALBEDO: AND PLANETARY THERMAL RADIATION FOR SPHERICAL: HEMISPHERICAL: CYLINDRICAL AND FLAT PLATES: AND OF INTERNAL HEAT LOADS.
AD-276 859 DIV. 12

*CONVECTION

THE FORCED CONVECTION HEAT LOSS FROM LONG THIN CYLINDERS PLACED NORMAL TO AN INCOMPRESSIBLE FLOW IS STUDIED.
AD-276 520 DIV. 25

*CONVERTIBLE AIRPLANES

LOW SPEED FREE AIR TESTS OF A POWERED .169 SCALE FOUR ENGINE TILT WING V/STOL MODEL.
AD-276 804 DIV. 1

*COPPER

EFFECT OF METAL ADDITIVES ON THE HYDROGEN OVERVOLTAGE OF CU POLYCRYSTALLINE AND SINGLE CRYSTAL CATHODES. ADDITIVES - CD: AS: SB: AND IN.
AD-276 870 DIV. 4

*COPPER ALLOYS

ORDER HARDENING IN CU3AU ALLOY WITH TENSILE PLASTIC DEFORMATION AS A FUNCTION OF ORDER DOMAIN SIZE.
AD-276 696 DIV. 17

*CORROSION RESEARCH

STRESS CORROSION TEST DATA ON ROCKET CASE MATERIALS UNDER SYNTHETIC ENVIRONMENTS.
AD-276 846 DIV. 17

*COSMIC RAYS

ASYMPTOTIC DIRECTIONS OF PRIMARY COSMIC-RAY PROTONS ARRIVING AT DURHAM AND MT. WASHINGTON, N. H.
AD-276 806 DIV. 20

A FILAMENT SCINTILLATION CHAMBER FOR THE MEASUREMENT OF A UNIVERSAL FERMI INTERACTION.
AD-276 745 DIV. 20

*COUPLED ANTENNAS

TIME MODULATION OF ARRAY ANTENNAS HAS APPLIED TO THE PROBLEMS OF OBTAINING ULTRA-LOW SIDELOBE AND SIMULTANEOUSLY SCANNED ANTENNA PATTERNS.
AD-276 699 DIV. 8

INVESTIGATIONS ON BROADBAND ANTENNAS: AND HIGH RESOLUTION ANTENNA TECHNIQUES.
AD-276 894 DIV. 8

*CRYSTAL HOLDERS

PRODUCTION METHODS AND TOOLS FOR THE PRODUCTION OF 500 CRYSTAL OSCILLATOR UNITS PER EIGHT HOUR SHIFT ARE BEING DEVISED.
AD-276 638 DIV. 8

*CRYSTAL OSCILLATORS

PRODUCTION METHODS AND TOOLS FOR THE PRODUCTION OF 500 CRYSTAL OSCILLATOR UNITS PER EIGHT HOUR SHIFT ARE BEING DEVISED.
AD-276 638 DIV. 8

*CRYSTAL RECTIFIERS

TESTS TO DETERMINE THE SERVICE LIFE OF TYPE 1N540 SILICON RECTIFIERS.
AD-276 987 DIV. 8

EVALUATION OF SILICON METALLIC RECTIFIERS: LIFTE TEST DATA ARE PRESENTED.
AD-276 989 DIV. 8

*CRYSTAL STRUCTURE

POINT DEFECTS AND DISLOCATIONS IN SILVER CHLORIDE CRYSTALS.
AD-276 839 DIV. 25

*CYBERNETICS

MATHEMATICAL PROGRAMMING: MAN-COMPUTER RESEARCH: AND SYSTEM CONTROL.
AD-276 919 DIV. 15

ELECTRONIC PROPERTIES OF CONTACTS ON SEMICONDUCTOR MATERIALS. SURFACE POTENTIALS AND RESISTANCE MEASUREMENTS ON ETCHED AND OXIDIZED SURFACES OF P- AND N-TYPE SI CRYSTALS.
AD-276 706 DIV. 8

PREPARATION OF LIF CRYSTALS FOR ROLLING CONTACT STUDIES - CLEAVAGE: POLISHING: AND ETCHING OF CRYSTALS: ELECTRON BEAM IRRADIATION: RADIATION EFFECTS.
AD-276 887 DIV. 25

A BIBLIOGRAPHY OF HIGH PRESSURE TECHNIQUES AND PHENOMENA: CHEMICAL AND PHYSICAL. CRYSTAL GROWTH IN SOLUTIONS AT HIGH TEMPERATURE AND PRESSURE. OVER 2,000 REFERENCES.
AD-276 941 DIV. 25

*DATA

APPROACHES TO THE ANALYSIS OF SOCIOMETRIC DATA. A SURVEY OF THE LITERATURE.
AD-276 827 DIV. 28

*DATA PROCESSING SYSTEMS

VERTICAL DATA PROCESSING: PARALLEL COMPUTING WITH VERTICAL DATA.
AD-276 993 DIV. 30

AN INFORMATION RETRIEVAL SYSTEM FOR AIRCRAFT STRUCTURAL MATERIALS.
AD-276 890 DIV. 32

STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS:
AD-276 999 DIV. 30

*DATA STORAGE SYSTEMS

CRYOSAR OPERATION AND APPLICATION: IMPACT IONIZATION: CRYOSAR CIRCUITRY: CRYSTAL GROWING - IMPURITIES.
AD-276 907 DIV. 30

*DATA TRANSMISSION SYSTEMS

AN INVESTIGATION AND ANALYSIS OF DIGITAL DATA COMMUNICATION SYSTEMS.
AD-276 847 DIV. 5

*DECOMPOSITION

MOLECULAR ORIGINS OF HCN: C2H2: C2H4: C3H8: CH3CN PRODUCED FROM THE REACTION OF ACTIVE N WITH PROPYLENE. RELATIVE RADIOACTIVITIES OF PRODUCTS FROM 3 PROPYLENES EACH LABELED AT A SPECIFIC CARBON ATOM.
AD-276 948 DIV. 4

*DEMOLITIONS

CUTTING AND DEMOLISHING USING HOLLOW EXPLOSIVE CHARGES: SELECTION OF CHARGE DESIGN: EFFECTIVE RANGE: TRANSPORTATION AND HANDLING: APPLICATIONS: (NAIL-DRIVING GUN).
AD-276 807 DIV. 22

*DESIGN

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION: WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

*DETECTION

CUMULATIVE DETECTION PROBABILITY OF A UNIFORMLY SCANNING SEARCH RADAR: CURVES OF DETECTION PROBABILITY AS A FUNCTION OF NORMALIZED RANGE FOR 3 DIFFERENT TARGET SCINTILLATION MODELS.
AD-276 931 DIV. 8

*DIAPHRAGMS (MECHANICS)

USE OF EXPLOSIVE MATERIALS TO OPEN THE DIAPHRAGM UTILIZED FOR THE RELEASE OF CHAMBER PRESSURE IN A 6-IN. GAS-MODEL LAUNCHER: LINEAR SHAPED MILD DETONATING FUZE (MDF) EMPLOYED TO RUPTURE STAINLESS STEEL DIAPHRAGM OF LIGHT-GAS GUN.
AD-276 911 DIV. 22

*DIELECTRICS

EFFECTS OF SIMULATED SPACE ENVIRONMENT ON ELECTRICAL PROPERTIES OF SOLID INSULATING MATERIALS.
AD-276 867 DIV. 14

*DIFFERENTIAL EQUATIONS

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 881 DIV. 7

"INSTABILITY" INTRODUCED BY THE CHOICE OF ALGORITHM.
AD-276 990 DIV. 15

*DIGITAL COMPUTERS

PROGRAMMING SYSTEM THAT MEETS THE REQUIREMENTS OF THE SPACE DETECTION AND TRACKING (SPADATS) SEMI-AUTOMATIC CENTER: PROGRAM DESCRIPTIONS: SPECIFICATIONS: AND FUNCTIONS.
AD-276 814 DIV. 30

ABSTRACTS OF ARTICLES: SPEECHES: AND ADVANCED DEGREE THESES OF LINCOLN LABORATORY. AUTHORS FROM APRIL 1960 TO APRIL 1962. ALL ASPECTS OF RADAR AND EQUIPMENTS AND THEORY. COMPUTER DESIGN COMPONENTS: AND APPLICATIONS.
AD-276 880 DIV. 8

*DIGITAL SYSTEMS

SIMPAC: TOWARD A GENERAL SIMULATION CAPABILITY.
AD-276 891 DIV. 30

SIMPAC: A RESEARCH TOOL FOR SIMULATION.
AD-276 898 DIV. 30

AN INVESTIGATION AND ANALYSIS OF DIGITAL DATA COMMUNICATION SYSTEMS.
AD-276 847 DIV. 5

CRYOSAR OPERATION AND APPLICATION: IMPACT IONIZATION: CRYOSAR CIRCUITRY: CRYSTAL GROWING - IMPURITIES.
AD-276 907 DIV. 30

*DIODES

THERMIONIC EMITTER MATERIALS: TA AND MO EMITTERS: CURRENT VOLTAGE CURVES: ION CURRENT MEASUREMENTS: PARAMETRIC CURVES.
AD-276 934 DIV. 8

EVALUATION OF SILICON METALLIC RECTIFIERS: LIFTE TEST DATA ARE PRESENTED.
AD-276 989 DIV. 8

*DIPOLE ANTENNAS

TWO ANTENNAS WHICH GIVE DIRECTIONAL PATTERNS WHICH CAN BE POINTED TO ANY AZIMUTH ANGLE BY ELECTRONIC MEANS: CONCENTRIC RINGS OF DIPOLES: AND CONCENTRIC LOOPS.
AD-276 951 DIV. 8

*DIRECTION FINDING

RADIO DIRECTION FINDING OVER A TROPOSCATTER PATH: FLUCTUATIONS IN BEARING ESTIMATES OF A MICROWAVE INTERFEROMETER AT 910 MC WITH THE TRANSMITTER LOCATED BEYOND THE HORIZON.
AD-276 907 DIV. 6

*DISPLAY SYSTEMS

DISPLAY-CONTROL SYSTEMS AND OPERATOR PERFORMANCE DURING TARGET ACQUISITION AND TRACKING USING 3 DIMENSIONS OF INFORMATION PRESENTED ON 2-DIMENSIONAL DISPLAY SURFACES.
AD-276 904 DIV. 28

*DISSOCIATION

EXCITATION OF NITRIC OXIDE AND ATOMIC OXYGEN IN AFTERGLOW SOURCES.
AD-276 824 DIV. 25

REFLECTION AND DISSOCIATION OF MOLECULAR HYDROGEN ON TUNGSTEN.
AD-276 845 DIV. 25

*DOSE RATE

THE ANGULAR DISTRIBUTION OF DOSE RATE FROM GAMMA RAYS SCATTERED THRU VARIOUS THICKNESSES OF IRON AND ALUMINUM.
AD-276 918 DIV. 20

*DOSIMETERS

COBALT GLASS DOSIMETERS WERE USED TO MEASURE THERMAL NEUTRON FIELDS IN THE PRESENCE OF A FAST NEUTRON FIELD.
AD-276 862 DIV. 6

*DRAG

NOSE AND INLET SHAPES OF MINIMUM DRAG IN SUPERSONIC FLOW.
AD-276 819 DIV. 9

*DUAL ROTATION PROPELLERS

OPEN-WATER EVALUATION TESTS OF A SET OF MODEL COUNTERROTATING PROPELLERS FOR AN ESCORT RESEARCH SHIP.
AD-276 997 DIV. 31

*DUCT INLETS

NOSE AND INLET SHAPES OF MINIMUM DRAG IN SUPERSONIC FLOW.
AD-276 819 DIV. 9

*ECOLOGY

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 26

*ECONOMICS

ESTIMATES OF SOVIET NATIONAL INCOME AND PRODUCT AT CURRENT ESTABLISHED PRICES FOR THE YEARS 1956-1958 AND AT CURRENT ADJUSTED (TO CORRECT FOR DISTORTION CAUSED BY INDIRECT TAXES) PRICES FOR THE YEARS 1949-1958. THE SEVEN YEAR PLAN.
AD-276 933 DIV. 32

*EDUCATION

A PLAN FOR MODELING A SCHOOL SYSTEM ON A DIGITAL COMPUTER, AUTOMATION OF THE LEARNING PROCESS BY ELIMINATING STUDENTS. STRUCTURING OF THE SCHOOL CURRICULUM AND TRAINING OF TEACHERS. REPRESENTATION OF A LEARNING THEORY.
AD-276 982 DIV. 28

*ELASTICITY

CALCULATION OF THE DYNAMIC RESPONSE ROOTS OF AN AEROELASTIC SYSTEM FROM ITS CONVENTIONAL FLUTTER ROOTS.
AD-276 872 DIV. 9

A GENERALIZED THEORY OF ELASTIC DISLOCATION IS APPLIED TO A DUAL RADIAL OUT PROBLEM TO JUSTIFY THE SUPERPOSITION PRINCIPLE.
AD-276 769 DIV. 25

*ELASTOMERS

PLASTICS AND ELASTOMERS: SHOCK RESISTANCE TO SUDDENLY APPLIED LOADS: SIX ELASTOMERIC AND 11 RIGID PLASTIC CONICAL SPECIMENS WERE SUBJECTED TO SHOCKS GENERATED BY PBN3 DETONATED AT THEIR BASE. AN ARCTIC SBR ELASTOMER SHOWED UNUSUAL RESISTANCE.
AD-276 883 DIV. 14

POLY(ETHYLENE TETRASULFIDE) POLYMERS: STRESS RELAXATION: SPECIFIC RATE CONSTANT FOR BOND INTERCHANGE: ACTIVATION ENERGY.
AD-276 991 DIV. 6

*ELECTRIC ARCS

THE EFFECTS OF INERT GASES ON THE SPECTRAL CHARACTERISTICS OF ARC DISCHARGES.
AD-276 803 DIV. 25

*ELECTRIC DETONATORS

ELECTRONIC TIME-DELAY AND DOUBLE-POWER PULSE GENERATOR ARE DESCRIBED: THE UNIT ENERGIES 2 ELECTRIC EXPLOSIVE INITIATORS WITH AN ACCURATE TIME INTERVAL BETWEEN INITIATIONS THAT IS VARIABLE BETWEEN 2 AND 102 MSEC.
AD-276 840 DIV. 22

*ELECTRIC DISCHARGES

PREDICTING SONIC PULSE SHAPES OF UNDERWATER SPARK DISCHARGES FOR USE IN MAPPING THE OCEAN BOTTOM.
AD-276 883 DIV. 25

*ELECTRIC POWER PRODUCTION

THE PRESENT STATE OF DEVELOPMENT OF AUTOMATED ELECTRIC POWER SUPPLY IN THE USSR IS DISCUSSED.
AD-276 804 DIV. 7

ELECTRIFICATION PRODUCED BY THE DYNAMIC INTERACTION OF LIQUIDS WITH SOLIDS: THE GENERATION AND STATIC ELECTRIFICATION OF ELECTRICAL POWER AT HIGH VOLTAGE: APPLICATION FOR OPERATION OF FUZE TO ACTIVATE IGNITED TO DETONATE MISSILE WARHEAD.
AD-276 859 DIV. 7

*ELECTRIC SWITCHES

A MONITORING DEVICE FOR DETECTING THE DURATION OF SWITCH CHATTER WAS SUCCESSFULLY TESTED.
AD-276 982 DIV. 30

*ELECTRICAL EQUIPMENT

THE PRESENT STATE OF DEVELOPMENT OF AUTOMATED ELECTRIC POWER SUPPLY IN THE USSR IS DISCUSSED.
AD-276 804 DIV. 7

*ELECTRICAL NETWORKS

THE USE OF STATISTICAL PROCESSES AND QUADRATIC FORMS TO ESTIMATE THE POWER SPECTRUM AND COVARIANCES.
AD-276 628 DIV. 25

*ELECTRICAL PROPERTIES

ELECTRON DENSITY AND COLLISION FREQUENCY OF ARC-HEATED ARGON PLASMA:
AD-276 909 DIV. 9

*ELECTROLYTIC CELLS

DEVELOPMENT OF SEALED SILVER OXIDE-ZINC SECONDARY CELL CAPABLE OF DELIVERING 500 TWO-HOUR CYCLES AT TEMPERATURES BETWEEN 0 AND 100 F.
AD-276 849 DIV. 7

*ELECTROMAGNETIC FIELDS

HALL EFFECTS IN A LORENTZ GAS.
AD-276 848 DIV. 25

*ELECTROMAGNETIC WAVES

LIMITATIONS IMPOSED BY THE ATMOSPHERE IN LOCATING THE POSITION OF A VEHICLE: LIMITATIONS IMPOSED BY THE TROPOSPHERE AND IONOSPHERE.
AD-276 843 DIV. 12

STUDIES OF THE PHENOMENA OCCURRING IN AN ELECTROMAGNETIC SHOCK TUBE.
AD-276 650 DIV. 25

INTERACTION OF MICROWAVES IN GASEOUS PLASMAS IMMERSED IN MAGNETIC FIELDS.
AD-276 736 DIV. 25

NON-LINEAR RESPONSE OF PLASMAS TO ELECTROMAGNETIC WAVES AND SURFACE WAVE PROPAGATION IN MAGNETO PLASMAS:
AD-276 889 DIV. 9

*ELECTROMAGNETS

SUPERCONDUCTIVITY AND SUPERCONDUCTING ELECTROMAGNETS MATERIALS AND PROPERTIES: BARDEEN-

COOPER-SHRIEFFER THEORY; SUPERCONDUCTING DEVICES; ELECTROMAGNETS; HIGH-FIELD SOLENOID CALCULATION.
AD-276 979 DIV. 25

*ELECTROMECHANICAL CONVERTERS

TWO ELECTROMECHANICAL GYRATOR DESIGNS, WITH COUPLED PIEZOELECTRIC AND PIEZOMAGNETIC TRANSDUCERS, WERE USED TO COVER THE FREQUENCY RANGE, 375C-1MC. LOW FREQUENCY HALL EFFECT GYRATOR OR MULTITERMINAL DEVICES. NEUTRALIZATION OF ELECTROMECHANICAL GYRATORS TO FORM ISOLATORS.
AD-276 645 DIV. 8

*ELECTRON ACCELERATORS

THE COMPUTATION OF THE MOTION OF ELECTRONS IN A BETATRON WITH AN INCREASING TOROIDAL MAGNETIC FIELD.
AD-276 602 DIV. 20

*ELECTRON BEAMS

EFFECTS OF ELECTRON BEAM CONFINEMENT ON KLYSTRON EFFICIENCY.
AD-276 503 DIV. 8

AN INVESTIGATION WAS MADE OF THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE.
AD-276 643 DIV. 8

*ELECTRON BOMBARDMENT

PRODUCTION AND RECOVERY OF ELECTRON-INDUCED RADIATION DAMAGE IN A NUMBER OF METALS.
AD-276 681 DIV. 17

VARIATION OF RADIATION DAMAGE PARAMETERS IN SELECTED METALS.
AD-276 682 DIV. 17

*ELECTRON MASS

HALL EFFECTS IN A LORENTZ GAS.
AD-276 648 DIV. 25

*ELECTRON MICROSCOPY

INVESTIGATION OF SOLID SURFACES BY FIELD EMISSION MICROSCOPY AND MASS SPECTROMETRY.
AD-276 787 DIV. 25

*ELECTRON TUBES

EFFORTS WERE MADE TO ESTABLISH THE MANUFACTURING CAPABILITY AND FACILITIES TO PRODUCE A MINIMUM OF 100 ELECTRON TUBES PER MONTH. STUDIES WERE MADE TO IMPROVE PRODUCIBILITY BY ADVANCED PRODUCTION TECHNIQUES.
AD-276 673 DIV. 8

*ELECTRONIC CIRCUITS

A STUDY OF THE EFFECTS OF VARIATION IN TRANSISTORS AND OTHER COMPONENT PARAMETERS ON THE CIRCUIT PERFORMANCE OF GENERAL USAGE ASSEMBLIES. DATA ARE PRESENTED ON THE CONTROL OF PRIMARY DESIGN FACTORS EFFECTING CIRCUIT RELIABILITY.
AD-276 826 DIV. 8

*ELECTRONIC EQUIPMENT

OPTIMAL SCHEDULING OF REPLACEMENT AND INSPECTION FOR STOCHASTICALLY FAILING EQUIPMENT.
AD-276 720 DIV. 8

*ELECTRONIC SCANNERS

TWO ANTENNAS WHICH GIVE DIRECTIONAL PATTERNS WHICH CAN BE POINTED TO ANY AZIMUTH ANGLE BY ELECTRONIC MEANS; CONCENTRIC RINGS OF DIPOLES; AND CONCENTRIC LOOPS.
AD-276 991 DIV. 8

*ELECTRONS

MU-MESONIC ATOM STUDIES OF TI, FE, CU, ZN, TL, PB, AND BI, ARE DESCRIBED.
AD-276 879 DIV. 25

*ELECTROSTATIC FUZES

ELECTRIFICATION PRODUCED BY THE DYNAMIC INTERACTION OF LIQUIDS WITH SOLIDS; THE GENERATION AND STATIC ELECTRIFICATION OF ELECTRICAL POWER AT HIGH VOLTAGE; APPLICATION FOR OPERATION OF FUZE TO ACTIVATE IGNITED TO DETONATE MISSILE WARHEAD.
AD-276 889 DIV. 7

*EMPLOYEE RELATIONS

THE COMPUTER AS A TOOL FOR DEVELOPMENT OF SOCIOLOGICAL THEORY.
AD-276 996 DIV. 32

*EPOXIDES

KETENE; GROUND STATE O ATOMS PRODUCED BY THE PHOTOLYSIS OF N2O REACT WITH ACETYLENE TO PRODUCE KETENE.
AD-276 963 DIV. 4

THERMOSETTING POLYMERS; SENSITIVITY OF ELECTRICAL VOLUME RESISTANCE TO STRUCTURE - MAGNITUDE AND TEMPERATURE DEPENDENCE OF RES. TIVITY; GLASS TRANSITION; THERMAL STABILITY.
AD-276 978 DIV. 14

*EQUATIONS

SUCCESSIVE APPROXIMATION APPLIED TO THE SYNTHESIS OF LINEAR SEPARABILITY.
AD-276 673 DIV. 19

*ERRORS

EVALUATION OF A BURST-ERROR CORRECTION CODE ON A GILBERT CHANNEL.
AD-276 527 DIV. 8

THE PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS.
AD-276 978 DIV. 2

*ESTERS

UNSATURATED POLYESTERS WERE CROSSLINKED WITH STYRENE AND THE RUBBER ELASTICITY WAS MEASURED AS A FUNCTION OF TEMPERATURE; PROPYLENE GLYCOL AND MALEIC AND PHTHALIC ANHYDRIDES.
AD-276 865 DIV. 14

*ETHANOLS

DISPERSION AT MILLIMETER WAVELENGTHS IN METHYL AND ETHYL ALCOHOLS.
AD-276 550 DIV. 25

*EUROPIUM

THE PREPARATION OF HIGH PURITY RARE EARTH METALS.
AD-276 748 DIV. 4

*EXCITATION

PRELIMINARY ASSIGNMENT OF SILICONE 28 EXCITED STATES.
AD-276 844 DIV. 20

*EXPLOSIONS

2.5- TO 40-LB CHARGES OF 4 TYPES OF EXPLOSIVES WERE DETONATED AT THE EDGE OF THE GREENLAND ICE CAP; ICE-EXPLOSION DATA WERE OBTAINED FOR SHOCK AND AIRBLAST PRESSURE, SEISMIC WAVES, CRATERING, AND FRACTURE.
AD-276 605 DIV. 22

*EXPLOSIVES

2.5- TO 40-LB CHARGES OF 4 TYPES OF EXPLOSIVES WERE DETONATED AT THE EDGE OF THE GREENLAND ICE CAP; ICE-EXPLOSION DATA WERE OBTAINED FOR SHOCK AND AIRBLAST PRESSURE, SEISMIC WAVES, CRATERING, AND FRACTURE.
AD-276 605 DIV. 22

CUTTING AND DEMOLISHING USING HOLLOW EXPLOSIVE CHARGES; SELECTION OF CHARGE DESIGN; EFFECTIVE RANGE; TRANSPORTATION AND HANDLING; APPLICATIONS; (NAIL-DRIVING GUN).
AD-276 807 DIV. 22

THE DEPENDENCE OF THE ELECTRICAL CONDUCTIVITY OF SULFUR UPON PRESSURE IS USED TO MEASURE A PRESSURE-TIME PROFILE FOR DETONATING BARATOL.
AD-276 986 DIV. 22

*EXTRATERRESTRIAL BASES

THE FEASIBILITY OF ESTABLISHING AN INDUSTRIAL PLANT ON THE MOON IS DISCUSSED.
AD-276 886 DIV. 30

*FACTOR ANALYSIS

PAPERS ARE PRESENTED ON THE APPLICATION OF MULTIVARIATE METHODS TO SUBSTANTIVE PROBLEMS. OTHER PAPERS ARE ON LOGIC AND MATHEMATICS. THE PROBLEMS DISCUSSED ARE MAINLY IN THE AREA OF BEHAVIOR AND PERSONALITY TESTING.
AD-276 607 DIV. 28

THE STRUCTURE OF INDIVIDUAL DIFFERENCES IN SELF-INCONSISTENCY WAS EXPLORED USING AS THE BASIC MEASURE OF INCONSISTENCY THE NUMBER OF CIRCULAR TRIADS MADE IN CHOOSING BETWEEN STIMULUS PAIRS PRESENTED IN PAIRED COMPARISON SCHEDULES.
AD-276 930 DIV. 28

*FAILURE (MECHANICS)

ACCELERATED LIFE TESTS OF ITEMS WITH MANY MODES OF FAILURE.
AD-276 743 DIV. 15

RELATION BETWEEN SYSTEM FAILURE RATE AND COMPONENT FAILURE RATE.
AD-276 843 DIV. 15

*FATIGUE (MECHANICS)

PREPARATION OF LIF CRYSTALS FOR ROLLING CONTACT STUDIES - CLEAVAGE; POLISHING; AND ETCHING OF CRYSTALS; ELECTRON BEAM IRRADIATION; RADIATION EFFECTS.
AD-276 827 DIV. 25

*FERRITES

MAGNETIC SUSCEPTIBILITY AS A FUNCTION OF MICROWAVE MAGNETIC FIELD INTENSITY OF SINGLE-CRYSTAL FERRITES WITH PLANAR ANISOTROPY.
AD-276 899 DIV. 14

*FERROELECTRIC CRYSTALS

TEMPERATURE DEPENDENT SPECTRUM OF ANTIFERROELECTRIC CRYSTALS GENERAL PROPERTIES OF LATTICE VIBRATIONAL SPECTRA OF PEROVSKITE MATERIALS.
AD-276 937 DIV. 25

*FERROELECTRIC MATERIALS

TEMPERATURE DEPENDENCE SPECTRUM OF ANTIFERROELECTRIC CRYSTALS GENERAL PROPERTIES OF LATTICE VIBRATIONAL SPECTRA OF PEROVSKITE MATERIALS.
AD-276 937 DIV. 25

*FERROMAGNETIC MATERIALS

TECHNIQUES AND APPARATUS FOR THE MEASUREMENT OF LINEWIDTHS OF POLYCRYSTALLINE FERROMAGNETIC MATERIALS ARE DESCRIBED.
AD-276 577 DIV. 25

GRINDING AND POLISHING OF HARD MATERIALS SUCH AS YTTRIUM-IRON GARNET FOR FERROMAGNETIC MICROWAVE AMPLIFIERS.
AD-276 586 DIV. 26

*FIELD EMISSION

INVESTIGATION OF SOLID SURFACES BY FIELD EMISSION MICROSCOPY AND MASS SPECTROMETRY.
AD-276 727 DIV. 25

*FIELD WIRE COMMUNICATION SYSTEMS

AN ANALYSIS OF THE MEANS OF AIR-LAYING WIRES AND CABLES WITH SUFFICIENT SLACK.
AD-276 618 DIV. 5

*FILAMENT WOUND CONSTRUCTION

EFFECTS OF RESIN COATINGS ON THE SINGLE FIBER STRENGTH OF GLASS FIBERS.
AD-276 636 DIV. 14

THE DESIGN; FABRICATION; AND TESTING OF FILAMENT WOUND FIBERGLASS PROPELLANT TANKS FOR HIGH-PRESSURE LIQUID ROCKET PROPELLANTS.
AD-276 713 DIV. 10

*FINISHES

GLASS FABRIC FINISHES; REINFORCED PLASTICS - POLYESTER; PHENOLIC AND EPOXY RESINS; EFFECTIVENESS OF BONDING THE RESINS WITH CHLORSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 646 DIV. 14

*FIRING CIRCUITS

ELECTRONIC TIME-DELAY AND DOUBLE-POWER PULSE GENERATOR ARE DESCRIBED; THE UNIT ENERGIZES 8 ELECTRIC EXPLOSIVE INITIATORS WITH AN ACCURATE TIME INTERVAL BETWEEN INITIATIONS THAT IS VARIABLE BETWEEN 8 AND 102 MSEC.
AD-276 840 DIV. 22

*FLANGES

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME; KNEE TYPE; STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 827 DIV. 13

*FLUID FLOW

MEASUREMENTS OF THE CORRELATION BETWEEN THE FLUCTUATING VELOCITIES AND THE FLUCTUATING WALL PRESSURE IN A THICK TURBULENT BOUNDARY LAYER.
AD-276 901 DIV. 9

*FLUORIDES

PREPARATION OF LIF CRYSTALS FOR ROLLING CONTACT STUDIES - CLEAVAGE; POLISHING; AND ETCHING OF CRYSTALS. ELECTRON BEAM IRRADIATION; RADIATION EFFECTS.
AD-276 827 DIV. 25

*FLUTTER

CALCULATION OF THE DYNAMIC RESPONSE ROOTS OF AN AEROELASTIC SYSTEM FROM ITS CONVENTIONAL FLUTTER ROOTS.
AD-276 870 DIV. 9

*FOAMS

MODULUS OF RUPTURE; CRUSHING STRENGTH; THERMAL CONDUCTIVITY; AND THERMAL EXPOSURE TEST DATA ON ALUMINA AND ZIRCONIA FOAMS.
AD-276 983 DIV. 14

*FOOD

APPARATUS AND METHODS FOR THE STEAM STERILIZATION OF FOOD FOR GERMFREE LABORATORY ANIMALS. INVESTIGATION OF THE PRACTICAL APPLICATION OF GNOTOBIOTIC TECHNOLOGY TO THE IMPROVEMENT OF BREEDING COLONIES.
AD-276 619 DIV. 16

*FRACTIONATION

DYNAMIC SIMULATION OF A DISTILLATION COLUMN WITH A COMBINED ANALOG-DIGITAL COMPUTER.
AD-276 973 DIV. 4

*FRACTURE (MECHANICS)

EFFECTS OF VARIOUS AUSTENITIZING TREATMENTS ON PLANE-STRAIN FRACTURE TOUGHNESS OF AISI 4340 STEEL.
AD-276 902 DIV. 17

*FUEL CELLS

DESIGN; DEVELOPMENT; AND TESTS OF HYDROX FUEL CELL SYSTEMS.
AD-276 524 DIV. 4

*FUNCTIONAL ANALYSIS

ENUMERATION OF REGULAR TRUTH FUNCTIONS.
AD-276 717 DIV. 15

SUCCESSIVE APPROXIMATION APPLIED TO THE SYNTHESIS OF LINEAR SEPARABILITY.
AD-276 878 DIV. 15

*FUNCTIONS

THE SYNTHESIS PROBLEM OF LINEAR SEPARABILITY.
AD-276 718 DIV. 15

AN ELIMINATION PROCESS FOR THE WILLIS SYNTHESIS METHOD.
AD-276 876 DIV. 15

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 881 DIV. 7

*GADOLINIUM

THE PREPARATION OF HIGH PURITY RARE EARTH METALS.
AD-276 748 DIV. 4

*GAMMA PROTON REACTIONS

PRELIMINARY ASSIGNMENT OF SILICONE 28 EXCITED STATES.
AD-276 846 DIV. 20

*GAMMA RAYS

PROCEDURE FOR THE DETERMINATION OF HIGH LEVELS OF ACTIVITY OF GAMMA RADIATION SOURCES; CHEMICAL CHANGES IN D(PLUS) MALTOSE BY GAMMA RADIATION. PRESENCE OF GLUCONIC AND GLUSURONIC ACIDS ESTABLISHED BY CHEMICAL AND INFRARED SPECTROPHOTOMETRIC ANALYSIS.
AD-276 578 DIV. 20

THE ANGULAR DISTRIBUTION OF DOSE RATE FROM GAMMA RAYS SCATTERED THRU VARIOUS THICKNESSES OF IRON AND ALUMINUM.
AD-276 918 DIV. 20

*GARNET

GRINDING AND POLISHING OF HARD MATERIALS SUCH AS YTTRIUM-IRON GARNET FOR FERROMAGNETIC MICROWAVE AMPLIFIERS.
AD-276 586 DIV. 26

*GAS DISCHARGES

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

*GAS IONIZATION

THE WEAK-FIELD LORENTZ GAS AND A PERTURBATION THEORY OF APPROXIMATE SOLUTION TO THE BOLTZMANN EQUATION.
AD-276 528 DIV. 25

*GAS VALVES

A PRESSURE REGULATOR WAS ANALYZED TO DETERMINE WHY THE REGULATOR FLUCTUATED FROM THE NON-MODULATING TO THE MODULATING MODE.
AD-276 586 DIV. 26

*GASES

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD.
AD-276 910 DIV. 9

*GENERATORS

A LONG-LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-276 597 DIV. 25

WAYS AND MEANS OF CONSTRUCTING DEVELOPMENTAL MODELS OF A CLOSE-SPACED; THIN SOLAR POWER CONVERTER USING THE PHOTOEMISSIVE PRINCIPLE.
AD-276 598 DIV. 8

*GEODESICS

THE PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS.
AD-276 976 DIV. 2

*GEOLOGY

METEOROLOGICAL-GEOLOGICAL INVESTIGATIONS OF THE WUPATKI BLOWHOLE SYSTEM IN NORTH CENTRAL ARIZONA.
AD-276 938 DIV. 2

*GERM FREE ANIMALS

APPARATUS AND METHODS FOR THE STEAM STERILIZATION OF FOOD FOR GERMFREE LABORATORY ANIMALS. INVESTIGATION OF THE PRACTICAL APPLICATION OF GNOTOBIOTIC TECHNOLOGY TO THE IMPROVEMENT OF BREEDING COLONIES.
AD-276 619 DIV. 16

*GERMANIUM

CRYOSAR OPERATION AND APPLICATION; IMPACT IONIZATION; CRYOSAR CIRCUITRY; CRYSTAL GROWING - IMPURITIES.
AD-276 907 DIV. 30

*GIRDERS

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME; KNEE TYPE; STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 827 DIV. 13

THE CONVERSION OF USNS MISSION CAPISTRANO (AG 162); FORMERLY (AG 113); TO AN ARTEMIS SUPPORT SHIP. STRUCTURAL INVESTIGATION OF THE HULL.
AD-276 996 DIV. 31

*GLACIERS

DRILL-HOLE MEASUREMENTS AND SNOW STUDIES AT BYRD STATION; ANTARCTICA.
AD-276 606 DIV. 2

THE ANTARCTIC ICE SHEET.
AD-276 609 DIV. 2

THE GREENLAND ICE SHEET.
AD-276 610 DIV. 2

GLACIOLOGICAL STUDIES ON FLETCHERS' ICE ISLAND.
AD-276 812 DIV. 2

*GLASS

COBALT GLASS DOSIMETERS WERE USED TO MEASURE THERMAL NEUTRON FIELDS IN THE PRESENCE OF A FAST NEUTRON FIELD.
AD-276 862 DIV. 6

*GLASS TEXTILES

EFFECTS OF RESIN COATINGS ON THE SINGLE FIBER STRENGTH OF GLASS FIBERS.
AD-276 636 DIV. 14

GLASS FABRIC FINISHES; REINFORCED PLASTICS - POLYESTER; PHENOLIC AND EPOXY RESINS; EFFECTIVENESS OF BONDING THE RESINS WITH CHLORSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 646 DIV. 14

THE DESIGN, FABRICATION, AND TESTING OF FILAMENT WOUND FIBERGLASS PROPELLANT TANKS FOR HIGH-PRESSURE LIQUID ROCKET PROPELLANTS.
AD-276 713 DIV. 10

GOLD ALLOYS

ORDER HARDENING IN CUSAU ALLOY WITH TENSILE PLASTIC DEFORMATION AS A FUNCTION OF ORDER DOMAIN SIZE.
AD-276 694 DIV. 17

GOVERNMENT PROCUREMENT

PROJECT COMET A PROJECT TO DEVELOP A COMPUTER-OPERATED MANAGEMENT EVALUATION TECHNIQUE FOR SIGNAL CORPS PROCUREMENT.
AD-276 938 DIV. 26

GRAPHITE

DETERMINATION OF SPECTRAL EMISSIVITY AND TOTAL NORMAL EMISSIVITY FOR MACHINED AND POLISHED SURFACES OF THREE COMMERCIAL GRAPHITES.
AD-276 966 DIV. 14

GREENLAND

THE GREENLAND ICE SHEET.
AD-276 610 DIV. 2

GROUND CONTROLLED APPROACH RADAR

DESIGN STUDY OF SIMPLE, LIGHTWEIGHT ANALOGUE DEVICES TO IMPROVE THE OPERATIONAL PERFORMANCE OF MOBILE USAF RADAR APPROACH CONTROL (RAPCON) FACILITIES.
AD-276 715 DIV. 30

GROUP DYNAMICS

APPROACHES TO THE ANALYSIS OF SOCIOMETRIC DATA. A SURVEY OF THE LITERATURE.
AD-276 827 DIV. 28

STUDIES WERE CONDUCTED ON MEASURABLE DIMENSIONS OF GROUP STRUCTURE AND THEIR RELATIONS TO GROUP BEHAVIOR.
AD-276 828 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS; AN ANNOTATED BIBLIOGRAPHY. V. ORGANIZATIONAL MANAGEMENT AND LEADERSHIP.
AD-276 831 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. LEADERSHIP IN FORMAL GROUPS.
AD-276 832 DIV. 28

RESULTS SUPPORT THE VALIDITY OF THE CLASSIFICATION SYSTEM AS A MEANS FOR SYSTEMATIC ORGANIZATION OF SMALL GROUP RESEARCH INFORMATION.
AD-276 896 DIV. 28

A SUMMARY OF SMALL GROUP RESEARCH STUDIES.
AD-276 860 DIV. 28

GUIDED MISSILE PERSONNEL

RELATIVE SAFETY OF PERSONNEL IN SELECTED AREAS DURING AN IM-99 LAUNCHING. DATA ON TEMPERATURE, NOISE AND TOXIC GASES WERE COLLECTED.
AD-276 988 DIV. 16

GUIDED MISSILE TRACKING SYSTEMS

MINUTES OF THE 2ND MEETING OF THE USERS TELEMETRY TRANSDUCERS WORKSHOP, IRIG, 25-26 JULY 1961, HOLLOMAN AFB, NEW MEXICO.
AD-276 639 DIV. 6

GUIDED MISSILES

OPTIMAL REPLACEMENT POLICIES FOR A BALLISTIC MISSILE.
AD-276 721 DIV. 12

DISCUSSION OF STRUCTURAL DESIGN REQUIREMENTS AND ANALYSIS OF ROCKETS, MISSILES, AND SPACECRAFT IS REPORTED.
AD-276 878 DIV. 12

TERRIER STRUCTURAL FIRING TESTS ABOARD THE USS CONSTELLATION (CVA-64). RESULTS INDICATED LARGE CONCENTRATIONS OF TOXIC GASES IN PERSONNEL AREAS ADJACENT TO LAUNCHERS. HOT PARTICLES FROM BURNING BOOSTER ON FLIGHT DECK AND SUPERFICIAL STRUCTURAL DAMAGE.
AD-276 908 DIV. 12

RELATIVE SAFETY OF PERSONNEL IN SELECTED AREAS DURING AN IM-99 LAUNCHING. DATA ON TEMPERATURE, NOISE AND TOXIC GASES WERE COLLECTED.
AD-276 988 DIV. 16

HALL EFFECT

HALL EFFECTS IN A LORENTZ GAS.
AD-276 648 DIV. 25

HARMONIC OSCILLATORS

AN EXAMINATION IS MADE OF THE RELATIONSHIP BETWEEN THE UNCERTAINTY PRINCIPLE AND MINIMUM AMPLIFIER NOISE.
AD-276 940 DIV. 8

HEAT RESISTANT ALLOYS

THE EFFECTS OF TEMPERATURE ON THE MACHINABILITY OF REFRACTORY METALS AND ALLOYS.
AD-276 882 DIV. 26

HEAT RESISTANT POLYMERS

THERMOSETTING POLYMERS: SENSITIVITY OF ELECTRICAL VOLUME RESISTANCE TO STRUCTURE - MAGNITUDE AND TEMPERATURE DEPENDENCE OF RESISTIVITY. GLASS TRANSITION. THERMAL STABILITY.
AD-276 578 DIV. 14

HIGH TEMPERATURE POLYMERS: PHOSPHONITRILE RING OPENING STUDIES. POLYMERIZATION SYNTHESIS. IR ATOMIC SPECTRA AR, HF, GE. LASER PROGRAM. NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 930 DIV. 25

HEAT TRANSFER

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD.
AD-276 910 DIV. 9

HEATING ELEMENTS

PRODUCTION METHODS AND TOOLS FOR THE PRODUCTION OF 500 CRYSTAL OSCILLATOR UNITS PER EIGHT HOUR SHIFT ARE BEING DEVISED.
AD-276 636 DIV. 8

HELICAL ANTENNAS

INVESTIGATIONS ON BROADBAND ANTENNAS AND HIGH RESOLUTION ANTENNA TECHNIQUES.
AD-276 894 DIV. 8

HELICOPTER ROTORS

A THEOREYICAL INVESTIGATION WITH WIND TUNNEL VERIFICATION OF THE OPTIMUM ROTOR GEOMETRY FOR A HIGH SPEED HELICOPTER.
AD-276 977 DIV. 9

HONEYCOMB CORES

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

HUMAN ENGINEERING

DISPLAY-CONTROL SYSTEMS AND OPERATOR PERFORMANCE DURING TARGET ACQUISITION AND TRACKING USING 3 DIMENSIONS OF INFORMATION PRESENTED ON 2-DIMENSIONAL DISPLAY SURFACES.
AD-276 904 DIV. 28

HYDROGEN

REFLECTION AND DISSOCIATION OF MOLECULAR HYDROGEN ON TUNGSTEN.
AD-276 645 DIV. 25

DESIGN, OPERATING INSTRUCTIONS, PROTOTYPE TESTING PROGRAM, AND MANUFACTURING PROCEDURES FOR A MYLAR FILM BLADDER FOR LIQUID HYDROGEN EXPULSION.
AD-276 984 DIV. 12

HYPERSONIC FLOW

REVIEW OF HIGH SPEED FLOW SEPARATION AND OF THE EFFECTIVENESS OF AERODYNAMIC CONTROLS FOR HYPERVELOCITY VEHICLES.
AD-276 714 DIV. 9

A METHOD IS PRESENTED FOR THE EXACT NUMERICAL CALCULATION OF THE ONE-DIMENSIONAL NONEQUILIBRIUM FLOW OF A GENERAL GAS MIXTURE THROUGH A HYPERSONIC NOZZLE.
AD-276 832 DIV. 9

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD.
AD-276 910 DIV. 9

HYPERSONIC NOZZLES

A METHOD IS PRESENTED FOR THE EXACT NUMERICAL CALCULATION OF THE ONE-DIMENSIONAL NONEQUILIBRIUM FLOW OF A GENERAL GAS MIXTURE THROUGH A HYPERSONIC NOZZLE.
AD-276 832 DIV. 9

HYPERSONIC WIND TUNNELS

SOURCE FLOW EFFECTS IN CONICAL HYPERVELOCITY NOZZLES ARE STUDIED BY MEANS OF A SIMPLE NEWTONIAN THEORY FOR SLENDER CONICAL BODIES.
AD-276 726 DIV. 30

AERODYNAMIC DESIGN STUDY OF A CONTINUOUS HYPERVELOCITY WIND TUNNEL FOR SIMULATING FLIGHT ENVIRONMENT OF LONG-RANGE BALLISTIC MISSILES AND GLIDE VEHICLES UP TO MACH 20.
AD-276 912 DIV. 30

HYPERSONICS

AERODYNAMIC DESIGN STUDY OF A CONTINUOUS HYPERVELOCITY WIND TUNNEL FOR SIMULATING FLIGHT ENVIRONMENT OF LONG-RANGE BALLISTIC MISSILES AND GLIDE VEHICLES UP TO MACH 20.
AD-276 912 DIV. 30

HYPERVELOCITY GUNS

THE METHOD OF CALCULATING THE BEHAVIOR OF A PROJECTILE PROPELLED BY A PRE-BURNED PROPELLANT IN A CHAMBERED GUN IS REVIEWED. THE CALCULATION BY HAND OF THE PERFORMANCE OF 2-STAGE GUNS IS OUTLINED.
AD-276 909 DIV. 22

USE OF EXPLOSIVE MATERIALS TO OPEN THE DIAPHRAGM UTILIZED FOR THE RELEASE OF CHAMBER PRESSURE IN A 9-IN. GAS-MODEL LAUNCHER. LINEAR SHAPED MILD DETONATING FUZE (MDF) EMPLOYED TO RUPTURE STAINLESS STEEL DIAPHRAGM OF LIGHT-GAS GUN.
AD-276 911 DIV. 22

HYPERVELOCITY PROJECTILES

THE METHOD OF CALCULATING THE BEHAVIOR OF A PROJECTILE PROPELLED BY A PRE-BURNED PROPELLANT IN A CHAMBERED GUN IS REVIEWED. THE CALCULATION BY HAND OF THE PERFORMANCE OF 2-STAGE GUNS IS OUTLINED.
AD-276 909 DIV. 22

HYPERVELOCITY VEHICLES

REVIEW OF HIGH SPEED FLOW SEPARATION AND OF THE EFFECTIVENESS OF AERODYNAMIC CONTROLS FOR HYPERVELOCITY VEHICLES.
AD-276 714 DIV. 9

HYPOTHERMIA

EFFECTS OF HYPOTHERMIA (BODY TEMPERATURE OF 15C) ON THE TISSUES AND CELLS OF RATS. INCREASE IN LIVER METABOLIC RATE, DECREASE IN KIDNEY CORTEX METABOLIC RATE, AND EVIDENCE OF CENTRAL NERVOUS SYSTEM DAMAGE NOTED.
AD-276 834 DIV. 16

ICE

A STUDY OF THE GROWTH OF AN ICE CLIFF IN GREENLAND.
AD-276 603 DIV. 2

COMPOSITION AND TENSILE STRENGTH OF SEA ICE.
AD-276 606 DIV. 2

2.5- TO 40-LB CHARGES OF 4 TYPES OF EXPLOSIVES WERE DETONATED AT THE EDGE OF THE GREENLAND ICE CAP. ICE-EXPLOSION DATA WERE OBTAINED FOR SHOCK AND AIRBLAST PRESSURE, SEISMIC WAVES, CRATERING, AND FRACTURE.
AD-276 608 DIV. 22

THE APPLICABILITY OF SEISMIC REFRACTION SOUNDINGS IN PERMAFROST NEAR THULE, GREENLAND.
AD-276 607 DIV. 2

THE ANTARCTIC ICE SHEET.
AD-276 609 DIV. 2

THE GREENLAND ICE SHEET.
AD-276 610 DIV. 2

GLACIOLOGICAL STUDIES ON FLETCHERS' ICE ISLAND.
AD-276 612 DIV. 2

IMAGE CONVERTER TUBES

RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IAYRON DIRECT VIEW STORAGE TUBES.
AD-276 897 DIV. 8

IMAGE INTENSIFIERS (ELECTRONICS)

INVESTIGATION ON TRANSMISSIVE SECONDARY EMISSION FILMS AND THEIR APPLICATIONS AS PRE-SCANNING BEAM AMPLIFIERS IN CAMERA TUBES IS SUMMARIZED.
AD-276 964 DIV. 8

INDUSTRIAL PSYCHOLOGY

EVIDENCE FOR LEADERSHIP CLIMATE OBTAINED ORDINARILY ONLY BY CONSIDERING MOTIVATIONAL AND COGNITIVE STRUCTURES WHICH EXIST AT THE ORGANIZATION LEVELS BEING STUDIED.
AD-276 702 DIV. 28

*INEQUALITIES

AN ELIMINATION PROCESS FOR THE WILLIS SYNTHESIS METHOD.
AD-276 876 DIV. 15

*INFORMATION RETRIEVAL

AN INFORMATION RETRIEVAL SYSTEM FOR AIRCRAFT STRUCTURAL MATERIALS.
AD-276 890 DIV. 32

*INFORMATION THEORY

THE SEQUENTIAL ESTIMATION AND DETECTION OF SIGNALS IN GAUSSIAN NOISE IS TREATED BY THE METHODS OF MAXIMUM LIKELIHOOD.
AD-276 830 DIV. 6

COMPARISON OF TWO HUMAN-PRODUCED REPORT SUMMARIES USING TERM-DIAGRAM FORMAT (SPATIAL ARRANGEMENT OF SUBJECTS, OBJECTS, AND MODIFIERS CONNECTED BY VERB PHRASES) AND NATURAL LANGUAGE. TERM DIAGRAM SUPERIOR FOR INFORMATION USERS.
AD-276 943 DIV. 32

*INFRARED SCANNING

ROCKET-BORNE INFRARED SCANNING RADIOMETER FOR HIGH ALTITUDE RADIATION MEASUREMENTS.
AD-276 897 DIV. 6

*INFRARED SPECTROSCOPY

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES; POLYMERIZATION SYNTHESIS, IR ATOMIC SPECTRA AR; HF; GE, LASER PROGRAM, NONLINEAR TRANSMISSION LINES, SEMICONDUCTOR PHYSICS, SMALL ANTENNA STUDY.
AD-276 930 DIV. 25

*INORGANIC SUBSTANCES

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS; PLASTICS; SYNTHETIC FIBERS; ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 621 DIV. 14

SYNTHESIS OF HIGH TEMPERATURE STABLE INORGANIC POLYMERS CONTAINING CATENATED TRIAZINE RINGS AND P-S-N BONDS.
AD-276 984 DIV. 4

*INTEGRATION

''INSTABILITY'' INTRODUCED BY THE CHOICE OF ALGORITHM.
AD-276 990 DIV. 13

*INTERCEPTION PROBABILITIES

OPTIMAL SYNTHESIS OF AIR DEFENSE SYSTEMS IN TERMS OF MARKOV MODELS.
AD-276 917 DIV. 19

*IONOSPHERE

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 938 DIV. 2

*IONOSPHERIC DISTURBANCES

VERTICAL DRIFT OF THE F-LAYER DURING ''NEGATIVE'' EARTH MAGNETIC BAY DISTURBANCES.
AD-276 706 DIV. 25

*IONOSPHERIC PROPAGATION

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 938 DIV. 2

*IRON

ELECTRIC QUADRUPOLE SPLITTING AND THE NUCLEAR VOLUME EFFECT IN THE IONIC COMPOUNDS OF IRON-57.
AD-276 726 DIV. 25

THE GROWTH OF IRON SINGLE CRYSTALS AND THE ROLE OF DISLOCATIONS.
AD-276 901 DIV. 17

*JET ENGINE NOISE

TESTS OF AN/MSQ-37 (RAYFAC) USED FOR REMOTE CHECKING OF COMMUNICATIONS, IDENTIFICATION, AND NAVIGATION SUBSYSTEMS CARRIED ON ADC AIRCRAFT.
AD-276 896 DIV. 1

*JET FIGHTERS

APPARATUS AND METHODS FOR THE STEAM STERILIZATION OF FOOD FOR GERMFREE LABORATORY ANIMALS. INVESTIGATION OF THE PRACTICAL APPLICATION OF GNOTOBIOTIC TECHNOLOGY TO THE IMPROVEMENT OF BREEDING COLONIES.
AD-276 610 DIV. 16

*JETS

LINEARIZED SUPERSONIC FLOW OF AN AXISYMMETRIC JET IN A SUPERSONIC STREAM IS ANALYZED BY MEANS OF PARTICULAR SINGULARITIES CALLED PSEUDOSOURCES.
AD-276 589 DIV. 9

*KLYSTRONS

EFFECTS OF ELECTRON BEAM CONFINEMENT ON KLYSTRON EFFICIENCY.
AD-276 923 DIV. 8

*LAMINAR BOUNDARY LAYER

THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD.
AD-276 910 DIV. 9

*LAMINATES

GLASS FABRIC FINISHES; REINFORCED PLASTICS - POLYESTER; PHENOLIC AND EPOXY RESINS; EFFECTIVENESS OF BONDING THE RESINS WITH CHLOROSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 646 DIV. 14

*LANDING

DESIGN STUDY OF SIMPLE, LIGHTWEIGHT ANALOGUE DEVICES TO IMPROVE THE OPERATIONAL PERFORMANCE OF MOBILE USAF RADAR APPROACH CONTROL (RAPCON) FACILITIES.
AD-276 719 DIV. 30

*LANDING FIELDS

SMALL SCALE MODEL STUDIES WERE MADE OF PRESTRESSED RIGID PAVEMENTS FOR AIRFIELDS. DEVELOPMENT OF THE MODEL AND RESULTS OF EXPLORATORY TESTS ARE GIVEN.
AD-276 815 DIV. 33

A METHOD FOR ESTIMATING THE LIFE OF RIGID AIRFIELD PAVEMENT.
AD-276 916 DIV. 33

*LASERS

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES; POLYMERIZATION SYNTHESIS, IR ATOMIC SPECTRA AR; HF; GE, LASER PROGRAM, NONLINEAR TRANSMISSION LINES, SEMICONDUCTOR PHYSICS, SMALL ANTENNA STUDY.
AD-276 930 DIV. 25

*LATTICES

TEMPERATURE DEPENDENT SPECTRUM OF ANTIFERROELECTRIC CRYSTALS GENERAL PROPERTIES OF LATTICE VIBRATIONAL SPECTRA OF PEROVSKITE MATERIALS.
AD-276 937 DIV. 25

LOCALIZED MODES AND SPIN-LATTICE INTERACTIONS.
AD-276 961 DIV. 25

*LAUNCHING SITES

RELATIVE SAFETY OF PERSONNEL IN SELECTED AREAS DURING AN IM-99 LAUNCHING. DATA ON TEMPERATURE, NOISE AND TOXIC GASES WERE COLLECTED.
AD-276 988 DIV. 14

*LEADERSHIP

EVIDENCE FOR LEADERSHIP CLIMATE OBTAINED ORDINARILY ONLY BY CONSIDERING MOTIVATIONAL AND COGNITIVE STRUCTURES WHICH EXIST AT THE ORGANIZATION LEVELS BEING STUDIED.
AD-276 702 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. V, ORGANIZATIONAL MANAGEMENT AND LEADERSHIP.
AD-276 831 DIV. 28

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. LEADERSHIP IN FORMAL GROUPS.
AD-276 832 DIV. 28

*LEARNING

COMPUTER SIMULATIONS OF A PERCEPTUAL LEARNING MODEL FOR SENSORY PATTERN RECOGNITION; CONCEPT FORMATION; AND SYMBOL TRANSFORMATION.
AD-276 703 DIV. 30

*LENS ANTENNAS

INVESTIGATIONS ON BROADBAND ANTENNAS; AND HIGH RESOLUTION ANTENNA TECHNIQUES.
AD-276 894 DIV. 8

*LIGHT COMMUNICATION SYSTEMS

RESULTS OF STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING FOR TWO HYPOTHETICAL, OPTICAL, SPACE COMMUNICATIONS LINKS. SERVO TRACKING LOOP DESIGN AND ACQUISITION AND TRACKING SENSITIVITY ARE AMONG ITEMS DISCUSSED.
AD-276 564 DIV. 5

*LIGHTING EQUIPMENT

DESIGN AND MANUFACTURING REQUIREMENTS FOR REFLECTORS TO BE USED WITH HIGH-POWERED XENON LAMPS FOR STREET LIGHTING. USSR.
AD-276 801 DIV. 7

*LINEAR PROGRAMMING

TECHNIQUES FOR THE CONSTRAINED OPTIMIZATION OF COMMUNICATION NETS.
AD-276 916 DIV. 8

*LINEAR SYSTEMS

AN ELIMINATION PROCESS FOR THE WILLIS SYNTHESIS METHOD.
AD-276 876 DIV. 15

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 881 DIV. 7

*LITHIUM COMPOUNDS

PREPARATION OF LIF CRYSTALS FOR ROLLING CONTACT STUDIES - CLEAVAGE, POLISHING, AND ETCHING OF CRYSTALS. ELECTRON BEAM IRRADIATION; RADIATION EFFECTS.
AD-276 887 DIV. 25

*LOAD DISTRIBUTION

BOUSSINESQ'S PROBLEM FOR A HEATED PUNCH II. SOLUTION FOR A CYLINDRICAL PUNCH. III. SOLUTION FOR A CONICAL PUNCH.
AD-276 567 DIV. 25

*LOOP ANTENNAS

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 538 DIV. 2

TWO ANTENNAS WHICH GIVE DIRECTIONAL PATTERNS WHICH CAN BE POINTED TO ANY AZIMUTH ANGLE BY ELECTRONIC MEANS; CONCENTRIC RINGS OF DIPOLES; AND CONCENTRIC LOOPS.
AD-276 591 DIV. 8

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES; POLYMERIZATION SYNTHESIS, IR ATOMIC SPECTRA AR; HF; GE, LASER PROGRAM, NONLINEAR TRANSMISSION LINES, SEMICONDUCTOR PHYSICS, SMALL ANTENNA STUDY.
AD-276 930 DIV. 25

*LOW PASS FILTERS

DESIGN EXPRESSIONS FOR CRITICALLY COUPLED, BILATERALLY MATCHED FILTERS AT MICROWAVE FREQUENCIES.
AD-276 903 DIV. 8

*LUBRICATION

THEORIES OF ELASTOHYDRODYNAMIC LUBRICATION ARE REVIEWED. CONTACT SHAPE MEASUREMENTS AND PRESSURE DISTRIBUTION DETERMINATION.
AD-276 537 DIV. 26

*LUNAR PROBES

RESULTS OF STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING FOR TWO HYPOTHETICAL, OPTICAL, SPACE COMMUNICATIONS LINKS. SERVO TRACKING LOOP DESIGN AND ACQUISITION AND TRACKING SENSITIVITY ARE AMONG ITEMS DISCUSSED.
AD-276 564 DIV. 5

*LUTECIUM

THE PREPARATION OF HIGH PURITY RARE EARTH METALS.
AD-276 748 DIV. 4

*MAGNETIC FIELDS

VERTICAL DRIFT OF THE F-LAYER DURING ''NEGATIVE'' EARTH MAGNETIC BAY DISTURBANCES.
AD-276 706 DIV. 25

TECHNIQUES UTILIZING HALL GENERATORS IN MEASURING PRECISION MAGNETIC FIELDS IN ACCELERATORS. INDIUM ARSENIDE AND ANTIMONIDE SEMICONDUCTORS; HALL EFFECT; RESISTANCE; DESIGN.
AD-276 737 DIV. 25

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

***MAGNETIC MODULATORS**

TWO EXPERIMENTAL HIGH-POWER PULSE MODULATORS ARE DESCRIBED. THE CIRCUITS WITH AVERAGE OUTPUT POWERS OF 2000 AND 140 WATTS INCORPORATE A COMBINATION OF SEMICONDUCTOR AND MAGNETIC SWITCHING.
AD-276 902 DIV. 8

***MAGNETIC PINCH**

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

***MAGNETOHYDRODYNAMICS**

A LONG-LIFE CLOSED-LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
AD-276 997 DIV. 25

***MAGNETOMETERS**

THEORETICAL AND PRACTICAL CHARACTERISTICS OF TWO DUAL-GAS-CELL, SELF-OSCILLATING RUBIDIUM-VAPOR MAGNETOMETERS.
AD-276 692 DIV. 30

***MAGNETOSTRICTION TRANSDUCERS**

TWO ELECTROMECHANICAL GYRATOR DESIGNS, WITH COUPLED PIEZOELECTRIC AND PIEZOMAGNETIC TRANSDUCERS, WERE USED TO COVER THE FREQUENCY RANGE, 375C-1MC. LOW FREQUENCY HALL EFFECT GYRATOR OR MULTITERMINAL DEVICES. NEUTRALIZATION OF ELECTROMECHANICAL GYRATORS TO FORM ISOLATORS.
AD-276 845 DIV. 8

***MAINTENANCE**

OPTIMAL SCHEDULING OF REPLACEMENT AND INSPECTION FOR STOCHASTICALLY FAILING EQUIPMENT.
AD-276 730 DIV. 8

***MANAGEMENT ENGINEERING**

WEAPON SYSTEM CONCEPT: DEFINITION AND HISTORICAL EVOLUTION: INSTRUMENTATION.
AD-276 358 DIV. 18

SIMPAC: TOWARD A GENERAL SIMULATION CAPABILITY.
AD-276 391 DIV. 30

SIMPAC: A RESEARCH TOOL FOR SIMULATION.
AD-276 396 DIV. 30

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS: AN ANNOTATED BIBLIOGRAPHY IV ORGANIZATIONAL STAFFING.
AD-276 830 DIV. 26

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. V. ORGANIZATIONAL MANAGEMENT AND LEADERSHIP.
AD-276 831 DIV. 26

PROJECT COMET A PROJECT TO DEVELOP A COMPUTER-OPERATED MANAGEMENT EVALUATION TECHNIQUE FOR SIGNAL CORPS PROCUREMENT.
AD-276 938 DIV. 26

***MANUFACTURING METHODS**

AN INDUSTRIAL CAPABILITY TO MANUFACTURE A 300 WATT SILICON AUDIO TRANSISTOR IS BEING ESTABLISHED. A SAMPLE DEVICE WAS CONSTRUCTED AND FABRICATION TECHNIQUES ARE PRESENTED.
AD-276 674 DIV. 8

***MAPPING**

THE PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS.
AD-276 978 DIV. 2

***MAPS**

SIMPLE SINGULARITIES OF MAPS.
AD-276 848 DIV. 15

***MARINE PROPELLERS**

OPEN-WATER EVALUATION TESTS OF A SET OF MODEL COUNTERROTATING PROPELLERS FOR AN ESCORT RESEARCH SHIP.
AD-276 997 DIV. 31

***MARS**

RECONNAISSANCE OF THE NEARER PLANETS A SURVEY OF PLANETARY PROBLEMS IN THE SPACE AGE.
AD-276 633 DIV. 2

***MASERS**

AN EXAMINATION IS MADE OF THE RELATIONSHIP BETWEEN THE UNCERTAINTY PRINCIPLE AND MINIMUM AMPLIFIER NOISE.
AD-276 940 DIV. 8

***MASS SPECTROSCOPY**

INVESTIGATION OF SOLID SURFACES BY FIELD EMISSION MICROSCOPY AND MASS SPECTROMETRY.
AD-276 727 DIV. 25

***MATERIALS**

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS: PLASTICS: SYNTHETIC FIBERS, ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 681 DIV. 14

ABSTRACTS OF TECHNICAL REPORTS PUBLISHED BY THE DIRECTORATE OF MATERIALS AND PROCESSES.
AD-276 709 DIV. 14

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION, WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 962 DIV. 26

***MATHEMATICAL LOGIC**

SOME QUEUING PROBLEMS WITH BALKING AND RENEGING.
AD-276 536 DIV. 15

TWO-IMPULSE TRANSFER VERSUS A ONE-IMPULSE TRANSFER. ANALYTIC THEORY.
AD-276 683 DIV. 15

ENUMERATION OF REGULAR TRUTH FUNCTIONS.
AD-276 717 DIV. 15

THE SYNTHESIS PROBLEM OF LINEAR SEPARABILITY.
AD-276 718 DIV. 15

***MATRIX ALGEBRA**

THE QUADRATIC CONVERGENCE OF THE CYCLIC VARIATION OF JACOBI'S METHOD.
AD-276 948 DIV. 15

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 681 DIV. 7

TECHNIQUES FOR THE CONSTRAINED OPTIMIZATION OF COMMUNICATION NETS.
AD-276 916 DIV. 8

***MEASUREMENT**

DISPERSION AT MILLIMETER WAVELENGTHS IN METHYL AND ETHYL ALCOHOLS.
AD-276 880 DIV. 25

***MEDICAL EQUIPMENT**

EXPERIMENTS DONE IN THE USSR ON THE PROSTHESIS OF THE ARM WITH BIOELECTRIC CONTROL.
AD-276 927 DIV. 16

***MEDICAL RESEARCH**

TWO SEQUENTIAL TWO-SAMPLE GROUPED TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
AD-276 864 DIV. 15

***MERCURY**

RECONNAISSANCE OF THE NEARER PLANETS A SURVEY OF PLANETARY PROBLEMS IN THE SPACE AGE.
AD-276 633 DIV. 2

***MESON BOMBARDMENT**

MU-MESONIC ATOM STUDIES OF TI, FE, CU, ZN, TL, PB, AND BI, ARE DESCRIBED.
AD-276 879 DIV. 25

***MESONS**

A FILAMENT SCINTILLATION CHAMBER FOR THE MEASUREMENT OF A UNIVERSAL FERMI INTERACTION.
AD-276 745 DIV. 20

***METAL JOINTS**

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME, KNEE TYPE, STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 657 DIV. 13

***METAL PLATES**

OBSERVATIONS AND MEASUREMENTS OF STRAIN DISTRIBUTIONS AT THE BASE OF NOTCHES AND CRACKS IN THIN FLAT METAL SHEETS.
AD-276 823 DIV. 25

***METALLURGICAL ANALYSIS**

PRODUCTION AND RECOVERY OF ELECTRON-INDUCED RADIATION DAMAGE IN A NUMBER OF METALS.
AD-276 681 DIV. 17

VARIATION OF RADIATION DAMAGE PARAMETERS IN SELECTED METALS.
AD-276 682 DIV. 17

INVESTIGATION OF SOLID SURFACES BY FIELD EMISSION MICROSCOPY AND MASS SPECTROMETRY.
AD-276 727 DIV. 25

***METALLURGY**

A BIBLIOGRAPHY OF BERYLLIUM FOR AUGUST-DECEMBER 1961. 309 REFERENCES.
AD-276 716 DIV. 17

***METALORGANIC COMPOUNDS**

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX: BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION: TURBIDOMETRIC STUDIES: CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 6

***METALS**

THE DEFORMATION MECHANISM OF FIBER-REINFORCED METAL AND ALLOY COMPOSITE MATERIALS.
AD-276 630 DIV. 17

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS: PLASTICS: SYNTHETIC FIBERS, ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 681 DIV. 14

FRACTURE STRESS DETERMINATIONS FOR FACE-CENTERED CUBIC METALS UNDER IMPULSIVE LOADING.
AD-276 738 DIV. 17

A SYSTEMATIC EVALUATION OF THE FUNDAMENTAL PARAMETERS GOVERNING FORMABILITY OF SHEET METALS AND ALLOYS.
AD-276 992 DIV. 26

***MICROWAVE AMPLIFIERS**

FEASIBILITY OF TWO BEAM-TYPE PARAMETRIC AMPLIFIERS, ONE CAPABLE OF NARROW BAND VOLTAGE-TUNED OPERATION AND THE OTHER CAPABLE OF BROADBAND UNTUNED OPERATION. DEVELOPMENT AND TESTS.
AD-276 983 DIV. 8

***MICROWAVE EQUIPMENT**

AN INVESTIGATION WAS MADE OF THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE.
AD-276 643 DIV. 8

***MICROWAVE OSCILLATORS**

AN EXAMINATION IS MADE OF THE RELATIONSHIP BETWEEN THE UNCERTAINTY PRINCIPLE AND MINIMUM AMPLIFIER NOISE.
AD-276 940 DIV. 8

***MICROWAVE PROBES**

A DESCRIPTION IS GIVEN OF AN AUTOMATIC WAVEGUIDE MEASURING INSTRUMENT WHICH DISPLAYS K-BAND REFLECTION FACTORS ON AN OSCILLOSCOPE. USSR.
AD-276 704 DIV. 30

***MICROWAVES**

RADIO DIRECTION FINDING OVER A TROPOSCATTER PATH: FLUCTUATIONS IN BEARING ESTIMATES OF A MICROWAVE INTERFEROMETER AT 910 MC WITH THE TRANSMITTER LOCATED BEYOND THE HORIZON.
AD-276 907 DIV. 6

INTERACTION OF MICROWAVES IN GASEOUS PLASMAS IMMERSED IN MAGNETIC FIELDS.
AD-276 736 DIV. 25

ABSTRACTS OF ARTICLES, SPEECHES, AND ADVANCED DEGREE THESES OF LINCOLN LABORATORY. AUTHORS FROM APRIL 1960 TO APRIL 1962. ALL ASPECTS OF RADAR AND EQUIPMENTS AND THEORY. COMPUTER DESIGN, COMPONENTS, AND APPLICATIONS.
AD-276 880 DIV. 8

***MILITARY COMMUNICATIONS**

AN ANALYSIS OF THE MEANS OF AIR-LAYING WIRES AND CABLES WITH SUFFICIENT SLACK.
AD-276 618 DIV. 5

***MILITARY TRAINING**

A ''FOLLOW-BACK'' TECHNIQUE WAS EMPLOYED TO VALIDATE THE SEVERAL PHASE GRADES IN ELECTRICIAN'S MATE A AND IN ELECTRICITY AND ELECTRONICS ''P'' SCHOOLS AGAINST AN 8-PART PERFORMANCE TEST; RESULTS WERE INCONCLUSIVE.
AD-276 983 DIV. 23

EFFECTIVENESS OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK: TWO EXPERIMENTS WHICH TESTED EFFECTIVENESS OF A READ-THROUGH TRAINING PROGRAM IN COMBATTING INEFFICIENCY.
AD-276 947 DIV. 23

MILITARY TRANSPORTATION

ABSTRACTS OF REPORTS PUBLISHED BY ARMY MOBILITY RESEARCH CENTER. TRAFFICABILITY OF SOILS.
AD-276 980 DIV. 13

MOLECULES

EXCITATION OF NITRIC OXIDE AND ATOMIC OXYGEN IN AFTERGLOW SOURCES.
AD-276 684 DIV. 25

MOLYBDENUM

THERMIONIC EMITTER MATERIALS: TA AND MO EMITTERS: CURRENT VOLTAGE CURVES: ION CURRENT MEASUREMENTS: PARAMETRIC CURVES.
AD-276 884 DIV. 8

MONITORS

A MONITORING DEVICE FOR DETECTING THE DURATION OF SWITCH CHATTER WAS SUCCESSFULLY TESTED.
AD-276 902 DIV. 30

MOON

THE FEASIBILITY OF ESTABLISHING AN INDUSTRIAL PLANT ON THE MOON IS DISCUSSED.
AD-276 886 DIV. 30

INSTRUCTIONS FOR THE USE OF MUTUAL MOON VISIBILITY CHARTS.
AD-276 879 DIV. 2

NAVAL PERSONNEL

A ''FOLLOW-BACK'' TECHNIQUE WAS EMPLOYED TO VALIDATE THE SEVERAL PHASE GRADES IN ELECTRICIAN'S MATE A AND IN ELECTRICITY AND ELECTRONICS ''P'' SCHOOLS AGAINST AN 8-PART PERFORMANCE TEST. RESULTS WERE INCONCLUSIVE.
AD-276 983 DIV. 23

NEUTRON CAPTURE

A PILAMENT SCINTILLATION CHAMBER FOR THE MEASUREMENT OF A UNIVERSAL FERMI INTERACTION.
AD-276 749 DIV. 20

NEUTRON COUNTERS

NEUTRON FLUX MEASUREMENTS OF RADIATION EFFECTS ON MATERIALS.
AD-276 938 DIV. 20

NEUTRON DETECTORS

NEUTRON FLUX MEASUREMENTS OF RADIATION EFFECTS ON MATERIALS.
AD-276 938 DIV. 20

NEUTRON FLUX DENSITY

NUCLEAR EMULSION TECHNIQUES ARE DESCRIBED WHICH ARE USED IN THE MEASUREMENT OF FAST-NEUTRON FLUXES AND SPECTRA IN RADIATION FIELDS ORIGINATING IN EITHER REACTORS OR RADIOISOTOPES.
AD-276 506 DIV. 20

THE EFFECT OF BORON-10 SHIELDS ON THE CALIBRATION OF NEUTRON-THRESHOLD DETECTORS.
AD-276 936 DIV. 20

NEUTRON FLUX MEASUREMENTS OF RADIATION EFFECTS ON MATERIALS.
AD-276 938 DIV. 20

NEUTRON SPECTRUM

NEUTRON FLUX MEASUREMENTS OF RADIATION EFFECTS ON MATERIALS.
AD-276 938 DIV. 20

NEUTRONS

NEUTRON FLUX MEASUREMENTS OF RADIATION EFFECTS ON MATERIALS.
AD-276 938 DIV. 20

NITRILES

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES. POLYMERIZATION SYNTHESIS. IR ATOMIC SPECTRA. AR; HF; GE. LASER PROGRAM. NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 930 DIV. 25

NITROGEN

MOLECULAR ORIGINS OF HCN; C2N2; C2H6; C3N3; CH3CN PRODUCED FROM THE REACTION OF ACTIVE N WITH PROPYLENE. RELATIVE RADIOACTIVITIES OF PRODUCTS FROM 3 PROPYLENES EACH LABELED AT A SPECIFIC CARBON ATOM.
AD-276 862 DIV. 4

NITROGEN COMPOUNDS

A SURVEY OF NITROGEN OXIDES AND PHOTOCHEMICAL SMOG FORMATION. PROBABILITY OF NITRIC ACID, ALKYL NITRATES, AND ACYL AND PERACYL NITRATES AS REACTION PRODUCTS. PHOTOCHEMICAL CONVERSION OF NITRIC OXIDE TO NITROGEN DIOXIDE IN SMOG-FORMATION.
AD-276 711 DIV. 4

NOISE (RADAR)

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

NOISE (RADIO)

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

NOISE ANALYZERS

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

NON-DESTRUCTIVE TESTING

POINT-CONTACT TRANSDUCERS FOR ULTRASONIC TESTING. THE FEASIBILITY WAS INVESTIGATED OF EMPLOYING POINT SHAPED ULTRASONIC TRANSDUCERS WHICH DIRECTLY AMPLIFY THE DETECTED ULTRASONIC SIGNAL.
AD-276 965 DIV. 30

NONLINEAR SYSTEMS

ANALOG SIMULATION OF FREQUENCY RESPONSE TECHNIQUES FOR NONLINEAR SERVOMECHANISMS.
AD-276 895 DIV. 30

NUCLEAR FLUORESCENT SCATTERING

ELECTRIC QUADRUPOLE SPLITTING AND THE NUCLEAR VOLUME EFFECT IN THE IONIC COMPOUNDS OF IRON-57.
AD-276 726 DIV. 25

NUCLEAR MAGNETIC RESONANCE

AN ULTRASONIC CW SPECTROMETER FOR THE INVESTIGATION OF ELECTRON SPIN-PHONON INTERACTIONS IN SOLIDS.
AD-276 960 DIV. 25

NUCLEAR RESONANCE

ELECTRIC QUADRUPOLE SPLITTING AND THE NUCLEAR VOLUME EFFECT IN THE IONIC COMPOUNDS OF IRON-57.
AD-276 726 DIV. 25

NUCLEAR SPINS

LOCALIZED MODES AND SPIN-LATTICE INTERACTIONS.
AD-276 961 DIV. 25

NUMERICAL ANALYSIS

''INSTABILITY'' INTRODUCED BY THE CHOICE OF ALGORITHM.
AD-276 990 DIV. 15

NYLON

THE VISCO-ELASTIC PROPERTIES OF RUBBER AND NYLON UNDER CONDITIONS OF RAPID STRAINING.
AD-276 525 DIV. 14

OCEANOGRAPHICAL DATA

PHYSICAL AND CHEMICAL DATA FOR SOUTHERN PUGET SOUND, AUGUST 1957 - OCTOBER 1958.
AD-276 967 DIV. 2

OPERATIONS RESEARCH

MATHEMATICAL PROGRAMMING, MAN-COMPUTER RESEARCH, AND SYSTEM CONTROL.
AD-276 919 DIV. 15

DYNAMIC PROGRAMMING, INTELLIGENT MACHINES, AND SELF-ORGANIZING SYSTEMS.
AD-276 933 DIV. 30

WEAPON SYSTEM CONCEPT; DEFINITION AND HISTORICAL EVOLUTION; INSTRUMENTATION.
AD-276 938 DIV. 16

OPTIMAL SYNTHESIS OF AIR DEFENSE SYSTEMS IN TERMS OF MARKOV MODELS.
AD-276 917 DIV. 15

OPTICAL SIGHTS

TRACKING TESTS WITH HELICOPTER FIRE CONTROL SYSTEM MOUNTED IN HSL HELICOPTER; STABILIZED SIGHTING SYSTEM; TRACKING ERROR AVERAGED APPROXIMATELY 2 MILS RMS. SIGNALS OBTAINED FROM AIRCRAFT NAVIGATIONAL EQUIPMENT.
AD-276 969 DIV. 6

OPTICAL TRACKING

RESULTS OF STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING FOR TWO HYPOTHETICAL OPTICAL SPACE COMMUNICATIONS LINKS. SERVO TRACKING LOOP DESIGN AND ACQUISITION AND TRACKING SENSITIVITY ARE AMONG ITEMS DISCUSSED.
AD-276 964 DIV. 9

TRACKING TESTS WITH HELICOPTER FIRE CONTROL SYSTEM MOUNTED IN HSL HELICOPTER; STABILIZED SIGHTING SYSTEM; TRACKING ERROR AVERAGED APPROXIMATELY 2 MILS RMS. SIGNALS OBTAINED FROM AIRCRAFT NAVIGATIONAL EQUIPMENT.
AD-276 969 DIV. 6

OPTICS

PROCEDURE FOR THE DETERMINATION OF HIGH LEVELS OF ACTIVITY OF GAMMA RADIATION SOURCES; CHEMICAL CHANGES IN DIPLUS MALTOSE BY GAMMA RADIATION. PRESENCE OF GLUCONIC AND GLUCURONIC ACIDS ESTABLISHED BY CHEMICAL AND INFRARED SPECTROPHOTOMETRIC ANALYSIS.
AD-276 978 DIV. 20

ORBITAL FLIGHT PATHS

ORBIT OF A SATELLITE WITH FIXED LOW THRUST FOR SOLAR OBSERVATION.
AD-276 684 DIV. 12

TWO-IMPULSE TRANSFER VERSUS A ONE-IMPULSE TRANSFER. ANALYTIC THEORY.
AD-276 689 DIV. 15

AN ANALYTIC PROOF THAT THE HOHMANN-TYPE TRANSFER IS THE TRUE MINIMUM TWO-IMPULSE TRANSFER.
AD-276 686 DIV. 15

ORGANIC COATINGS

GLASS FABRIC FINISHES; REINFORCED PLASTICS - POLYESTER, PHENOLIC AND EPOXY RESINS; EFFECTIVENESS OF BONDING THE RESINS WITH CHLOROSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 686 DIV. 14

ORGANIC MATERIALS

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS, PLASTICS, SYNTHETIC FIBERS, ORGANIC AND INORGANIC MATERIALS, AND METALS.
AD-276 681 DIV. 14

OXIDATION

KETENE; GROUND STATE O ATOMS PRODUCED BY THE PHOTOLYSIS OF N2O REACT WITH ACETYLENE TO PRODUCE KETENE.
AD-276 963 DIV. 4

OXIDES

ELECTRICAL AND THERMAL PROPERTIES OF OXIDE SEMICONDUCTOR MATERIALS.
AD-276 600 DIV. 14

OXYGEN

KETENE; GROUND STATE O ATOMS PRODUCED BY THE PHOTOLYSIS OF N2O REACT WITH ACETYLENE TO PRODUCE KETENE.
AD-276 963 DIV. 4

MEASUREMENT OF THE RECOMBINATION RATE OF OXYGEN BY THE USE OF A SHOCK-TUBE.
AD-276 626 DIV. 9

PAIN

DESIGN AND EQUIPMENTS FOR STUDYING EXPERIMENTAL PAIN. TWO DIFFERENT ELECTROCORTICAL REACTIONS ELICITED BY THERMORADIANT STIMULUS. MAIN DETERMINANT OF MAGNITUDE AND DURATION OF RESPONSE NOT INTENSITY OF STIMULUS, BUT CENTRAL FACTORS IN THE SUBJECT. COMPARISON WITH CLASSICAL THEORY. 102 REFS.
AD-276 719 DIV. 16

PARABOLIC ANTENNAS

A FLAT DIELECTRIC PLATE PLACED IN FRONT OF AN ANTENNA APERATURE INCREASES THE POWER GAIN OF THE APERTURE WITHOUT INCREASING THE PHYSICAL AREA. THE GAIN CAN BE FURTHER INCREASED BY MOVING A SINGLE OR DOUBLE DIELECTRIC PLATE ARRAY GRADUALLY AWAY FROM THE APERTURE.
AD-276 688 DIV. 8

PARACHUTES

DESIGN OF A CONTROLLED GLIDING PARACHUTE IS REPORTED.
AD-276 873 DIV. 1

PARAMETRIC AMPLIFIERS

FEASIBILITY OF TWO BEAM-TYPE PARAMETRIC AMPLIFIERS, ONE CAPABLE OF NARROW BAND VOLTAGE-TUNED OPERATION AND THE OTHER CAPABLE OF BROADBAND UNTUNED OPERATION. DEVELOPMENT AND TESTS.
AD-276 983 DIV. 8

PARTIAL DIFFERENTIAL EQUATIONS

OPTIMAL CONTROL OR UTILIZATION OF A SPECIFIED SYSTEM.
AD-276 936 DIV. 15

ON A MIXED BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES.
AD-276 664 DIV. 15

THE SYNTHESIS PROBLEM OF LINEAR SEPARABILITY.
AD-276 716 DIV. 15

PARTICLE TRAJECTORIES

ASYMPTOTIC DIRECTIONS OF PRIMARY COSMIC-RAY PROTONS ARRIVING AT DURHAM AND MT. WASHINGTON, N. H.
AD-276 908 DIV. 20

PAVEMENTS

SMALL SCALE MODEL STUDIES WERE MADE OF PRE-

STRESSED RIGID PAVEMENTS FOR AIRFIELDS. DEVELOPMENT OF THE MODEL AND RESULTS OF EXPLORATORY TESTS ARE GIVEN.
AD-276 515 DIV. 33

A METHOD FOR ESTIMATING THE LIFE OF RIGID AIRFIELD PAVEMENT.
AD-276 516 DIV. 33

*PERCEPTION

THE STRUCTURE OF INDIVIDUAL DIFFERENCES IN SELF-INCONSISTENCY WAS EXPLORED USING AS THE BASIC MEASURE OF INCONSISTENCY THE NUMBER OF CIRCULAR TRIADS MADE IN CHOOSING BETWEEN STIMULUS PAIRS PRESENTED IN PAIRED COMPARISON SCHEDULES.
AD-276 930 DIV. 28

*PERMAFROST

THE APPLICABILITY OF SEISMIC REFRACTION SOUNDINGS IN PERMAFROST NEAR THULE, GREENLAND.
AD-276 607 DIV. 2

*PERSONALITY

PAPERS ARE PRESENTED ON THE APPLICATION OF MULTIVARIATE METHODS TO SUBSTANTIVE PROBLEMS. OTHER PAPERS ARE ON LOGIC AND MATHEMATICS. THE PROBLEMS DISCUSSED ARE MAINLY IN THE AREA OF BEHAVIOR AND PERSONALITY TESTING.
AD-276 667 DIV. 28

THE STRUCTURE OF INDIVIDUAL DIFFERENCES IN SELF-INCONSISTENCY WAS EXPLORED USING AS THE BASIC MEASURE OF INCONSISTENCY THE NUMBER OF CIRCULAR TRIADS MADE IN CHOOSING BETWEEN STIMULUS PAIRS PRESENTED IN PAIRED COMPARISON SCHEDULES.
AD-276 930 DIV. 28

*PERSONALITY TESTS

THE STRUCTURE OF INDIVIDUAL DIFFERENCES IN SELF-INCONSISTENCY WAS EXPLORED USING AS THE BASIC MEASURE OF INCONSISTENCY THE NUMBER OF CIRCULAR TRIADS MADE IN CHOOSING BETWEEN STIMULUS PAIRS PRESENTED IN PAIRED COMPARISON SCHEDULES.
AD-276 930 DIV. 28

*PETROLEUM INDUSTRY

PRODUCTION; IMPORTS; AND CONSUMPTION OF PETROLEUM IN COMMUNIST CHINA 1949-1960. RESOURCES; COSTS; AND SOVIET TRADE POLICY IN PETROLEUM INDUSTRY DEVELOPMENT. 128 REFERENCES.
AD-276 532 DIV. 32

*PHASE MODULATION

STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS.
AD-276 999 DIV. 30

*PHOSPHORUS COMPOUNDS

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES; POLYMERIZATION SYNTHESIS. IR ATOMIC SPECTRA AR; HF; GE. LASER PROGRAM. NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 980 DIV. 25

SYNTHESIS OF HIGH TEMPERATURE STABLE INORGANIC POLYMERS CONTAINING CATENATED TRIAZINE RINGS AND P-S-N BONDS.
AD-276 924 DIV. 4

*PHOTO INTERPRETATION

A DETAILED ANALYSIS IS PRESENTED OF ELECTRONIC CORRELATION TECHNIQUES FOR CHANGE DETECTION.
AD-276 746 DIV. 24

*PHOTOCHEMICAL REACTIONS

A SURVEY OF NITROGEN OXIDES AND PHOTOCHEMICAL SMOG FORMATION. PROBABILITY OF NITRIC ACID; ALKYL NITRATES; AND ACYL AND PERACYL NITRATES AS REACTION PRODUCTS. PHOTOCHEMICAL CONVERSION OF NITRIC OXIDE TO NITROGEN DIOXIDE IN SMOG-FORMATION.
AD-276 711 DIV. 4

*PHOTOGRAPHIC EMULSIONS

NUCLEAR EMULSION TECHNIQUES ARE DESCRIBED WHICH ARE USED IN THE MEASUREMENT OF FAST-NEUTRON FLUXES AND SPECTRA IN RADIATION FIELDS ORIGINATING IN EITHER REACTORS OR RADIOISOTOPES.
AD-276 506 DIV. 20

*PHOTOGRAPHIC INTELLIGENCE

A DETAILED ANALYSIS IS PRESENTED OF ELECTRONIC CORRELATION TECHNIQUES FOR CHANGE DETECTION.
AD-276 746 DIV. 24

*PHOTOMULTIPLIERS

INVESTIGATION ON TRANSMISSIVE SECONDARY EMISSION FILMS AND THEIR APPLICATIONS AS PRE= SCANNING BEAM AMPLIFIERS IN CAMERA TUBES IS SUMMARIZED.
AD-276 984 DIV. 8

*PHOTOTUBES

WAYS AND MEANS OF CONSTRUCTING DEVELOPMENTAL MODELS OF A CLOSE-SPACED; THIN SOLAR POWER CONVERTER USING THE PHOTOEMISSIVE PRINCIPLE.
AD-276 998 DIV. 8

*PHYSICAL PROPERTIES

MEASUREMENT OF TEMPERATURE; SALINITY; AND VELOCITY OF WATER THROUGH ELECTROLYTIC CONDUCTIVITY MEASUREMENTS.
AD-276 747 DIV. 25

*PIEZOELECTRIC TRANSDUCERS

TWO ELECTROMECHANICAL GYRATOR DESIGNS; WITH COUPLED PIEZOELECTRIC AND PIEZOMAGNETIC TRANSDUCERS; WERE USED TO COVER THE FREQUENCY RANGE; 3?9C-1MC. LOW FREQUENCY HALL EFFECT GYRATOR OR MULTITERMINAL DEVICES. NEUTRALIZATION OF ELECTROMECHANICAL GYRATORS TO FORM ISOLATORS.
AD-276 845 DIV. 8

POINT-CONTACT TRANSDUCERS FOR ULTRASONIC TESTING. THE FEASIBILITY WAS INVESTIGATED OF EMPLOYING POINT SHAPED ULTRASONIC TRANSDUCERS WHICH DIRECTLY AMPLIFY THE DETECTED ULTRASONIC SIGNAL.
AD-276 968 DIV. 30

*PIONS

A FILAMENT SCINTILLATION CHAMBER FOR THE MEASUREMENT OF A UNIVERSAL FERMI INTERACTION.
AD-276 745 DIV. 20

*PLASMA PHYSICS

THE WEAK-FIELD LORENTZ GAS AND A PERTURBATION THEORY OF APPROXIMATE SOLUTION TO THE BOLTZMANN EQUATION.
AD-276 528 DIV. 25

WAVES ALONG HOMOGENEOUS PLASMA LAYERS.
AD-276 705 DIV. 25

INTERACTION OF MICROWAVES IN GASEOUS PLASMAS IMMERSED IN MAGNETIC FIELDS.
AD-276 736 DIV. 25

NON-LINEAR RESPONSE OF PLASMAS TO ELECTROMAGNETIC WAVES AND SURFACE WAVE PROPAGATION IN MAGNETO PLASMAS.
AD-276 869 DIV. 9

ELECTRON DENSITY AND COLLISION FREQUENCY OF ARC-HEATED ARGON PLASMA.
AD-276 909 DIV. 9

*PLASTICITY

ON THE PROPAGATION OF STRESS WAVES IN A RATE SENSITIVE PLASTIC MEDIUM.
AD-276 691 DIV. 25

*PLASTICS

PLASTICS AND ELASTOMERS; SHOCK RESISTANCE TO SUDDENLY APPLIED LOADS; SIX ELASTOMERIC AND 11 RIGID PLASTIC CONICAL SPECIMENS WERE SUBJECTED TO SHOCKS GENERATED BY PBN3 DETONATED AT THEIR BASE. AN ARCTIC SBR ELASTOMER SHOWED UNUSUAL RESISTANCE.
AD-276 983 DIV. 14

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS; PLASTICS; SYNTHETIC FIBERS; ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 621 DIV. 14

*POLARIZATION

THE POLARIZATION OF SUNLIGHT BY THE SEA SURFACE AT ANGLES OF INCIDENCE CLOSE TO THE BREWSTER ANGLE FOR THE LONG AND MEDIUM WAVELENGTHS OF THE SPECTRUM.
AD-276 738 DIV. 25

*POLYMER SOLUTIONS

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX; BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION; TURBIDOMETRIC STUDIES; CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 4

*POLYMERIZATION

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX; BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION; TURBIDOMETRIC STUDIES; CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 4

*POLYMERS

THERMOSETTING POLYMERS; SENSITIVITY OF ELECTRICAL VOLUME RESISTANCE TO STRUCTURE - MAGNITUDE AND TEMPERATURE DEPENDENCE OF RESISTIVITY; GLASS TRANSITION; THERMAL STABILITY.
AD-276 573 DIV. 14

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS; PLASTICS; SYNTHETIC FIBERS; ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 621 DIV. 14

POLYVINYL ALCOHOL; THERMODYNAMIC FUNCTIONS; THERMAL MOTIONS AT LOW TEMPERATURE.
AD-276 665 DIV. 4

POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX; BINDING OF ZN BY POLY-N-VINYLIMIDAZOLE AT 0.01 AND 0.10 M POLYMER CONCENTRATIONS SHOWED FOUR-FOLD COORDINATION; TURBIDOMETRIC STUDIES; CATALYTIC STUDIES OF THE DEHYDRATION OF H2CO3.
AD-276 669 DIV. 4

UNSATURATED POLYESTERS WERE CROSSLINKED WITH STYRENE AND THE RUBBER ELASTICITY WAS MEASURED AS A FUNCTION OF TEMPERATURE; PROPYLENE GLYCOL AND MALEIC AND PHTHALIC ANHYDRIDES.
AD-276 685 DIV. 14

SYNTHESIS OF HIGH TEMPERATURE STABLE INORGANIC POLYMERS CONTAINING CATENATED TRIAZINE RINGS AND P-S-N BONDS.
AD-276 924 DIV. 4

POLY(ETHYLENE TETRASULFIDE) POLYMERS; STRESS RELAXATION; SPECIFIC RATE CONSTANT FOR BOND INTERCHANGE; ACTIVATION ENERGY.
AD-276 991 DIV. 4

*POLYNOMIALS

THE QUADRATIC CONVERGENCE OF THE CYCLIC VARIATION OF JACOBI'S METHOD.
AD-276 945 DIV. 15

*POWER

THE USE OF STATISTICAL PROCESSES AND QUADRATIC FORMS TO ESTIMATE THE POWER SPECTRUM AND COVARIANCES.
AD-276 628 DIV. 25

*POWER SUPPLIES

THE PRESENT STATE OF DEVELOPMENT OF AUTOMATED ELECTRIC POWER SUPPLY IN THE USSR IS DISCUSSED.
AD-276 804 DIV. 7

ELECTRIFICATION PRODUCED BY THE DYNAMIC INTERACTION OF LIQUIDS WITH SOLIDS; THE GENERATION AND STATIC ELECTRIFICATION OF ELECTRICAL POWER AT HIGH VOLTAGE. APPLICATION FOR OPERATION OF FUZE TO ACTIVATE IGNITED TO DETONATE MISSILE WARHEAD.
AD-276 889 DIV. 7

*POWER TRANSFORMERS

WAYS AND MEANS OF CONSTRUCTING DEVELOPMENTAL MODELS OF A CLOSE-SPACED; THIN SOLAR POWER CONVERTER USING THE PHOTOEMISSIVE PRINCIPLE.
AD-276 998 DIV. 8

*PRASEODYMIUM

THE PREPARATION OF HIGH PURITY RARE EARTH METALS.
AD-276 748 DIV. 4

*PRECIPITATION

ESTIMATES OF THE EFFECT OF RAIN; CLOUDS; AND VERTICAL WIND ON ARTILLERY FIRE ARE GIVEN; AN EXAMPLE BASED ON THE MAX RANGE OF THE 105MM HOWITZER IS PRESENTED.
AD-276 837 DIV. 22

*PRECIPITATION STATIC

PRECIPITATION STATIC ELIMINATION AND RECEIVING LOOP ANTENNAS WITH TUNERS FOR AN IONOSPHERIC RESEARCH AIRCRAFT.
AD-276 536 DIV. 2

*PRESSURE

A BIBLIOGRAPHY OF HIGH PRESSURE TECHNIQUES AND PHENOMENA; CHEMICAL AND PHYSICAL. CRYSTAL GROWTH IN SOLUTIONS AT HIGH TEMPERATURE AND PRESSURE. OVER 2,000 REFERENCES.
AD-276 961 DIV. 25

*PRESSURE GAGES

MINUTES OF THE 2ND MEETING OF THE USERS TELEMETRY TRANSDUCERS WORKSHOP; IRIG. 25-26 JULY

1961: HOLLOMAN AFB: NEW MEXICO.
AD-276 639 DIV. 6

THE DEPENDENCE OF THE ELECTRICAL CONDUCTIVITY OF SULFUR UPON PRESSURE IS USED TO MEASURE A PRESSURE-TIME PROFILE FOR DETONATING BARATOL.
AD-276 986 DIV. 22

*PRESSURE REGULATORS

A PRESSURE REGULATOR WAS ANALYZED TO DETERMINE WHY THE REGULATOR FLUCTUATED FROM THE NON-MODULATING TO THE MODULATING MODE.
AD-276 956 DIV. 26

*PRESSURE VESSELS

FEASIBILITY STUDIES ON AN OVERLAPPING CYLINDER DESIGN FOR A SOLID PROPELLANT ROCKET MOTOR CASE.
AD-276 829 DIV. 27

*PROBABILITY

SOME QUEUING PROBLEMS WITH BALKING AND RENEGING.
AD-276 536 DIV. 15

TWO SEQUENTIAL TWO-SAMPLE GROUPED TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
AD-276 864 DIV. 15

THE PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS.
AD-276 978 DIV. 2

STATISTICAL TESTS ON SEVERAL DISTINCT HYPOTHESES OF DECISION PROBLEMS.
AD-276 980 DIV. 15

*PRODUCTION

EFFORTS WERE MADE TO ESTABLISH THE MANUFACTURING CAPABILITY AND FACILITIES TO PRODUCE A MINIMUM OF 100 ELECTRON TUBES PER MONTH. STUDIES WERE MADE TO IMPROVE PRODUCIBILITY BY ADVANCED PRODUCTION TECHNIQUES.
AD-276 673 DIV. 8

*PROGRAMMING

MATHEMATICAL PROGRAMMING: MAN-COMPUTER RESEARCH: AND SYSTEM CONTROL.
AD-276 919 DIV. 15

PROGRAMMING SYSTEM THAT MEETS THE REQUIREMENTS OF THE SPACE DETECTION AND TRACKING (SPADATS) SEMI-AUTOMATIC CENTER: PROGRAM DESCRIPTIONS: SPECIFICATIONS: AND FUNCTIONS.
AD-276 814 DIV. 30

*PROJECTILE TRAJECTORIES

ESTIMATES OF THE EFFECT OF RAIN: CLOUDS: AND VERTICAL WIND ON ARTILLERY FIRE ARE GIVEN: AN EXAMPLE BASED ON THE MAX RANGE OF THE 105MM HOWITZER IS PRESENTED.
AD-276 837 DIV. 22

*PROJECTILES

SHELL: A COMPUTER PROGRAM FOR DETERMINING THE PHYSICAL PROPERTIES OF ARTILLERY SHELLS AND RELATED ITEMS. PROPERTIES TO BE ASCERTAINED ARE WEIGHT: POLAR AND TRANSVERSE MOMENTS OF INERTIA: TOTAL MOMENT OF INERTIA: VOLUME AND CENTER OF GRAVITY.
AD-276 670 DIV. 22

*PROPELLANT GRAINS

TEMPERATURE DISTRIBUTION IN SEGMENTED MOTORS: THERMAL STRESSES AND PHOTOVISCOELASTIC PROPERTIES OF PLASTICIZED AND UNPLASTICIZED EPOXY GRAINS: AND TIME-TEMPERATURE SHIFT PHENOMENA ARE DISCUSSED.
AD-276 642 DIV. 27

*PROPELLANT TANKS

THE DESIGN: FABRICATION: AND TESTING OF FILAMENT WOUND FIBERGLASS PROPELLANT TANKS FOR HIGH-PRESSURE LIQUID ROCKET PROPELLANTS.
AD-276 713 DIV. 10

DESIGN: OPERATING INSTRUCTIONS: PROTOTYPE TESTING PROGRAM: AND MANUFACTURING PROCEDURES FOR A MYLAR FILM BLADDER FOR LIQUID HYDROGEN EXPULSION.
AD-276 986 DIV. 12

*PROPENES

MOLECULAR ORIGINS OF HCN: C2H2: C2H6: C3H8: CH3CN PRODUCED FROM THE REACTION OF ACTIVE N WITH PROPYLENE. RELATIVE RADIOACTIVITIES OF PRODUCTS FROM 3 PROPYLENES EACH LABELED AT A SPECIFIC CARBON ATOM.
AD-276 962 DIV. 4

*PROSTHETICS

EXPERIMENTS DONE IN THE USSR ON THE PROSTHESIS OF THE ARM WITH BIOELECTRIC CONTROL.
AD-276 927 DIV. 16

*PROTEINS

THE METHOD OF SELECTIVE WETTING AND OF NON-DISSOLVING VOLUME WERE USED IN THE MEASUREMENT OF THE SURFACE AND GENERAL HYDROPHILIC CHARACTERISTICS OF PROTEINIC AND COTTON FIBERS.
AD-276 806 DIV. 16

*PROTONS

ASYMPTOTIC DIRECTIONS OF PRIMARY COSMIC-RAY PROTONS ARRIVING AT DURHAM AND MT. WASHINGTON: N. H.
AD-276 908 DIV. 20

*PUGET SOUND

PHYSICAL AND CHEMICAL DATA FOR SOUTHERN PUGET SOUND: AUGUST 1957 - OCTOBER 1958.
AD-276 967 DIV. 2

*PULSE COMMUNICATION SYSTEMS

AN INVESTIGATION AND ANALYSIS OF DIGITAL DATA COMMUNICATION SYSTEMS.
AD-276 867 DIV. 5

*PULSE GENERATORS

TWO EXPERIMENTAL HIGH-POWER PULSE MODULATORS ARE DESCRIBED. THE CIRCUITS WITH AVERAGE OUTPUT POWERS OF 2000 AND 160 WATTS INCORPORATE A COMBINATION OF SEMICONDUCTOR AND MAGNETIC SWITCHING.
AD-276 902 DIV. 8

ELECTRONIC TIME-DELAY AND DOUBLE-POWER PULSE GENERATOR ARE DESCRIBED: THE UNIT ENERGIES 2 ELECTRIC EXPLOSIVE INITIATORS WITH AN ACCURATE TIME INTERVAL BETWEEN INITIATIONS THAT IS VARIABLE BETWEEN 2 AND 102 MSEC.
AD-276 840 DIV. 22

*QUALITY CONTROL

TWO SEQUENTIAL TWO-SAMPLE GROUPED TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
AD-276 864 DIV. 15

*RADAR

ABSTRACTS OF ARTICLES: SPEECHES: AND ADVANCED DEGREE THESES OF LINCOLN LABORATORY. AUTHORS FROM APRIL 1960 TO APRIL 1962. ALL ASPECTS OF RADAR AND EQUIPMENTS AND THEORY. COMPUTER DESIGN COMPONENTS: AND APPLICATIONS.
AD-276 880 DIV. 8

*RADAR ANTENNAS

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

TIME MODULATION OF ARRAY ANTENNAS WAS APPLIED TO THE PROBLEMS OF OBTAINING ULTRA-LOW SIDELOBE AND SIMULTANEOUSLY SCANNED ANTENNA PATTERNS.
AD-276 699 DIV. 8

A FLAT DIELECTRIC PLATE PLACED IN FRONT OF AN ANTENNA APERTURE INCREASES THE POWER GAIN OF THE APERTURE WITHOUT INCREASING THE PHYSICAL AREA. THE GAIN CAN BE FURTHER INCREASED BY MOVING A SINGLE OR DOUBLE DIELECTRIC PLATE ARRAY GRADUALLY AWAY FROM THE APERTURE.
AD-276 888 DIV. 8

A GREGORIAN CORRECTOR FOR SPHERICAL REFLECTORS.
AD-276 972 DIV. 8

*RADAR DUPLEXERS

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

*RADAR EQUIPMENT

USE OF DIGITAL COMPUTING TECHNIQUES TO IMPROVE PERFORMANCE IN THE REAL-TIME SIMULATION OF AIRBORNE RADARS IS ANALYZED.
AD-276 696 DIV. 6

*RADAR OPERATORS

EFFECTIVENESS OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK: TWO EXPERIMENTS WHICH TESTED EFFECTIVENESS OF A READ-THROUGH TRAINING PROGRAM: COMBATTING INEFFICIENCY.
AD-276 947 DIV. 23

*RADAR PULSES

TWO EXPERIMENTAL HIGH-POWER PULSE MODULATORS ARE DESCRIBED. THE CIRCUITS WITH AVERAGE OUTPUT POWERS OF 2000 AND 160 WATTS INCORPORATE A COMBINATION OF SEMICONDUCTOR AND MAGNETIC SWITCHING.
AD-276 902 DIV. 8

*RADAR RANGES

CUMULATIVE DETECTION PROBABILITY OF A UNIFORMLY SCANNING SEARCH RADAR: CURVES OF DETECTION PROBABILITY AS A FUNCTION OF NORMALIZED RANGE FOR 3 DIFFERENT TARGET SCINTILLATION MODELS.
AD-276 531 DIV. 6

*RADAR REFLECTORS

A GREGORIAN CORRECTOR FOR SPHERICAL REFLECTORS.
AD-276 972 DIV. 8

*RADAR SCANNING

CUMULATIVE DETECTION PROBABILITY OF A UNIFORMLY SCANNING SEARCH RADAR: CURVES OF DETECTION PROBABILITY AS A FUNCTION OF NORMALIZED RANGE FOR 3 DIFFERENT TARGET SCINTILLATION MODELS.
AD-276 531 DIV. 6

USE OF DIGITAL COMPUTING TECHNIQUES TO IMPROVE PERFORMANCE IN THE REAL-TIME SIMULATION OF AIRBORNE RADARS IS ANALYZED.
AD-276 696 DIV. 6

TIME MODULATION OF ARRAY ANTENNAS WAS APPLIED TO THE PROBLEMS OF OBTAINING ULTRA-LOW SIDELOBE AND SIMULTANEOUSLY SCANNED ANTENNA PATTERNS.
AD-276 699 DIV. 8

A GREGORIAN CORRECTOR FOR SPHERICAL REFLECTORS.
AD-276 972 DIV. 8

*RADAR TARGETS

CUMULATIVE DETECTION PROBABILITY OF A UNIFORMLY SCANNING SEARCH RADAR: CURVES OF DETECTION PROBABILITY AS A FUNCTION OF NORMALIZED RANGE FOR 3 DIFFERENT TARGET SCINTILLATION MODELS.
AD-276 531 DIV. 6

EFFECTIVENESS OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK: TWO EXPERIMENTS WHICH TESTED EFFECTIVENESS OF A READ-THROUGH TRAINING PROGRAM: COMBATTING INEFFICIENCY.
AD-276 947 DIV. 23

*RADAR TRACKING

LIMITATIONS IMPOSED BY THE ATMOSPHERE IN LOCATING THE POSITION OF A VEHICLE: LIMITATIONS IMPOSED BY THE TROPOSPHERE AND IONOSPHERE.
AD-276 943 DIV. 12

DISPLAY-CONTROL SYSTEMS AND OPERATOR PERFORMANCE DURING TARGET ACQUISITION AND TRACKING USING 3 DIMENSIONS OF INFORMATION PRESENTED ON 2-DIMENSIONAL DISPLAY SURFACES.
AD-276 904 DIV. 28

EFFECTIVENESS OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK: TWO EXPERIMENTS WHICH TESTED EFFECTIVENESS OF A READ-THROUGH TRAINING PROGRAM: COMBATTING INEFFICIENCY.
AD-276 947 DIV. 23

*RADIATION EFFECTS

MONTHLY ACCESSION LIST OF RADIATION EFFECTS INFORMATION CENTER OF BATTELLE MEMORIAL INSTITUTE. RADIATION EFFECTS ON ELECTRONIC EQUIPMENT: METALS: POLYMERS. PROBLEMS OF SPACE FLIGHT AND REACTORS.
AD-276 934 DIV. 20

*RADIO ASTRONOMY

LIMITATIONS IMPOSED BY THE ATMOSPHERE IN LOCATING THE POSITION OF A VEHICLE: LIMITATIONS IMPOSED BY THE TROPOSPHERE AND IONOSPHERE.
AD-276 943 DIV. 12

MAXIMUM-LIKELIHOOD ESTIMATION OF THE CORRELATION FUNCTION OF A THRESHOLD SIGNAL AND ITS APPLICATION TO THE MEASUREMENT OF THE TARGET SCATTERING FUNCTION IN RADAR ASTRONOMY.
AD-276 903 DIV. 2

*RADIO EQUIPMENT

TESTS OF AN/MSQ-37 (RADFAC) USED FOR REMOTE CHECKING OF COMMUNICATIONS: IDENTIFICATION: AND NAVIGATION SUBSYSTEMS: CARRIED ON ADC AIRCRAFT.
AD-276 996 DIV. 1

*RADIO INTERFEROMETERS

RADIO DIRECTION FINDING OVER A TROPOSCATTER PATH: FLUCTUATIONS IN BEARING ESTIMATES OF A MICROWAVE INTERFEROMETER AT 910 MC WITH THE TRANSMITTER LOCATED BEYOND THE HORIZON.
AD-276 909 DIV. 6

LIMITATIONS IMPOSED BY THE ATMOSPHERE IN LOCATING THE POSITION OF A VEHICLE: LIMITATIONS IMPOSED BY THE TROPOSPHERE AND IONOSPHERE.
AD-276 943 DIV. 12

*RADIOFREQUENCY FILTERS

DESIGN EXPRESSIONS FOR CRITICALLY COUPLED: BILATERALLY MATCHED FILTERS AT MICROWAVE FREQUENCIES.
AD-276 905 DIV. 8

*RADIOFREQUENCY GENERATORS

AN EXAMINATION IS MADE OF THE RELATIONSHIP BETWEEN THE UNCERTAINTY PRINCIPLE AND MINIMUM AMPLIFIER NOISE.
AD-276 940 DIV. 8

***RADIOFREQUENCY POWER**

STUDY OF METHODS OF MEASURING POWER DENSITY. APPLICATION OF SLOT ANTENNAS TO POWER DENSITY MEASUREMENT.
AD-276 582 DIV. 8

***RADIOMETERS**

ROCKET-BORNE INFRARED SCANNING RADIOMETER FOR HIGH ALTITUDE RADIATION MEASUREMENTS.
AD-276 647 DIV. 8

A PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
AD-276 668 DIV. 8

***RARE EARTHS**

THE PREPARATION OF HIGH PURITY RARE EARTH METALS.
AD-276 748 DIV. 4

***RECOMBINATION REACTIONS**

MEASUREMENT OF THE RECOMBINATION RATE OF OXYGEN BY THE USE OF A SHOCK-TUBE.
AD-276 636 DIV. 9

***RECTIFIERS**

EVALUATION OF SILICON METALLIC RECTIFIERS; LIFTE TEST DATA ARE PRESENTED.
AD-276 989 DIV. 8

***REFLECTORS**

DESIGN AND MANUFACTURING REQUIREMENTS FOR REFLECTORS TO BE USED WITH HIGH-POWERED XENON LAMPS FOR STREET LIGHTING. USSR.
AD-276 801 DIV. 7

***REFRIGERATION SYSTEMS**

DEVICES FOR THE REMOVAL OF OIL AND MOISTURE FROM COMPRESSED AIR WERE TESTED.
AD-276 805 DIV. 13

***REINFORCING MATERIALS**

THE DEFORMATION MECHANISM OF FIBER-REINFORCED METAL AND ALLOY COMPOSITE MATERIALS.
AD-276 630 DIV. 17

***RELIABILITY**

ACCELERATED LIFE TESTS OF ITEMS WITH MANY MODES OF FAILURE.
AD-276 743 DIV. 15

RELATION BETWEEN SYSTEM FAILURE RATE AND COMPONENT FAILURE RATE.
AD-276 843 DIV. 15

***RESISTANCE**

PRODUCTION AND RECOVERY OF ELECTRON-INDUCED RADIATION DAMAGE IN A NUMBER OF METALS.
AD-276 651 DIV. 17

VARIATION OF RADIATION DAMAGE PARAMETERS IN SELECTED METALS.
AD-276 652 DIV. 17

***ROCKET CASES**

FEASIBILITY STUDIES ON AN OVERLAPPING CYLINDER DESIGN FOR A SOLID PROPELLANT ROCKET MOTOR CASE.
AD-276 529 DIV. 27

STRESS CORROSION TEST DATA ON ROCKET CASE MATERIALS UNDER SYNTHETIC ENVIRONMENTS.
AD-276 646 DIV. 17

***ROCKET MOTOR NOZZLES**

APPROXIMATE METHODS FOR DETERMINING THERMAL STRESSES IN ROCKET MOTOR NOZZLES BASED ON THE ASSUMPTION; THE NOZZLE IS A FLAT SLAB WITH NO BENDING DISTORTION.
AD-276 642 DIV. 27

***ROCKET MOTORS**

TEMPERATURE DISTRIBUTION IN SEGMENTED MOTORS; THERMAL STRESSES AND PHOTOVISCOELASTIC PROPERTIES OF PLASTICIZED AND UNPLASTICIZED EPOXY GRAINS; AND TIME-TEMPERATURE SHIFT PHENOMENA ARE DISCUSSED.
AD-276 642 DIV. 27

***ROCKETS**

EQUATIONS OF MOTION DESCRIBING THE POSITION IN SPACE; PITCH; YAW AND ROLL OF AN UNGUIDED ROCKET. VECTOR FORCES AND MOMENTS ARE DEFINED. NUMERICAL INTEGRATION OF THESE EQUATIONS IS DISCUSSED.
AD-276 971 DIV. 22

***RUBBER**

THE VISCO-ELASTIC PROPERTIES OF RUBBER AND NYLON UNDER CONDITIONS OF RAPID STRAINING.
AD-276 525 DIV. 16

***RUNWAYS**

SMALL SCALE MODEL STUDIES WERE MADE OF PRE-STRESSED RIGID PAVEMENTS FOR AIRFIELDS. DEVELOPMENT OF THE MODEL AND RESULTS OF EXPLORATORY TESTS ARE GIVEN.
AD-276 513 DIV. 33

A METHOD FOR ESTIMATING THE LIFE OF RIGID AIRFIELD PAVEMENT.
AD-276 516 DIV. 33

***SAFETY VALVES**

A PRESSURE REGULATOR WAS ANALYZED TO DETERMINE WHY THE REGULATOR FLUCTUATED FROM THE NON-MODULATING TO THE MODULATING MODE.
AD-276 556 DIV. 26

***SALINITY**

COMPOSITION AND TENSILE STRENGTH OF SEA ICE.
AD-276 604 DIV. 2

***SANDWICH CONSTRUCTION**

A BIBLIOGRAPHY OF REPORTS ON FLAT PLATE SANDWICH CONSTRUCTION; WITH EMPHASIS ON LIGHTWEIGHT MATERIALS.
AD-276 963 DIV. 26

***SATELLITE VEHICLE TRAJECTORIES**

RESEARCH ON OPTICAL AND RADIO METHODS OF TRACKING SATELLITES.
AD-276 728 DIV. 12

***SATELLITE VEHICLES**

LIMITATIONS IMPOSED BY THE ATMOSPHERE IN LOCATING THE POSITION OF A VEHICLE; LIMITATIONS IMPOSED BY THE TROPOSPHERE AND IONOSPHERE.
AD-276 843 DIV. 12

RESULTS OF STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING FOR TWO HYPOTHETICAL; OPTICAL; SPACE COMMUNICATIONS LINKS. SERVO TRACKING LOOP DESIGN AND ACQUISITION AND TRACKING SENSITIVITY ARE AMONG ITEMS DISCUSSED.
AD-276 864 DIV. 5

RESEARCH ON OPTICAL AND RADIO METHODS OF TRACKING SATELLITES.
AD-276 728 DIV. 12

PROGRAMMING SYSTEM THAT MEETS THE REQUIREMENTS OF THE SPACE DETECTION AND TRACKING (SPADATS) SEMI-AUTOMATIC CENTER; PROGRAM DESCRIPTIONS; SPECIFICATIONS; AND FUNCTIONS.
AD-276 814 DIV. 30

DISCUSSION OF STRUCTURAL DESIGN REQUIREMENTS AND ANALYSIS OF ROCKETS, MISSILES; AND SPACECRAFT IS REPORTED.
AD-276 878 DIV. 12

***SCATTERING**

DISPERSION AT MILLIMETER WAVELENGTHS IN METHYL AND ETHYL ALCOHOLS.
AD-276 930 DIV. 25

MU-MESONIC ATOM STUDIES OF TI, FE, CU, ZN, TL, PB, AND BI, ARE DESCRIBED.
AD-276 579 DIV. 25

***SCHEDULING**

OPTIMAL SCHEDULING OF REPLACEMENT AND INSPECTION FOR STOCHASTICALLY FAILING EQUIPMENT.
AD-276 780 DIV. 8

***SCIENTIFIC REPORTS**

A SUMMARY OF SMALL GROUP RESEARCH STUDIES.
AD-276 860 DIV. 20

ABSTRACTS OF ARTICLES; SPEECHES; AND ADVANCED DEGREE THESES OF LINCOLN LABORATORY. AUTHORS FROM APRIL 1960 TO APRIL 1962. ALL ASPECTS OF RADAR AND EQUIPMENTS AND THEORY. COMPUTER DESIGN COMPONENTS; AND APPLICATIONS.
AD-276 880 DIV. 8

***SEA WATER**

COMPOSITION AND TENSILE STRENGTH OF SEA ICE.
AD-276 604 DIV. 2

***SEALS**

PRODUCTION METHODS AND TOOLS FOR THE PRODUCTION OF 500 CRYSTAL OSCILLATOR UNITS PER EIGHT HOUR SHIFT ARE BEING DEVISED.
AD-276 638 DIV. 8

***SEARCH RADAR**

CUMULATIVE DETECTION PROBABILITY OF A UNIFORMLY SCANNING SEARCH RADAR; CURVES OF DETECTION PROBABILITY AS A FUNCTION OF NORMALIZED RANGE FOR 3 DIFFERENT TARGET SCINTILLATION MODELS.
AD-276 931 DIV. 6

***SEISMIC WAVES**

THE APPLICABILITY OF SEISMIC REFRACTION SOUNDINGS IN PERMAFROST NEAR THULE, GREENLAND.
AD-276 607 DIV. 2

***SELENIDES**

THERMOELECTRIC PROPERTIES OF TUNGSTEN AND MOLYBDENUM DISELENIDES AND OF MOLYBDENUM DITELLURIDE.
AD-276 996 DIV. 14

***SELENIUM**

ELECTRICAL PROPERTIES OF SELENIUM WITH ADMIXTURE OF BISMUTH.
AD-276 707 DIV. 25

***SEMICONDUCTORS**

ELECTRICAL AND THERMAL PROPERTIES OF OXIDE SEMICONDUCTOR MAVERIALS.
AD-276 600 DIV. 14

REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM GOLD-DOPED MONOCRYSTALLINE SILICON THERMISTORS; THERMAL STABILITY, RESISTIVITY, PROCESSING, PRODUCTION.
AD-276 659 DIV. 8

TECHNIQUES UTILIZING HALL GENERATORS IN MEASURING PRECISION MAGNETIC FIELDS IN ACCELERATORS. INDIUM ARSENIDE AND ANTIMONIDE SEMICONDUCTORS; HALL EFFECT; RESISTANCE; DESIGN.
AD-276 737 DIV. 25

ELECTRONIC PROPERTIES OF CONTACTS ON SEMICONDUCTOR MATERIALS. SURFACE POTENTIALS AND RESISTANCE MEASUREMENTS ON ETCHED AND OXIDIZED SURFACES OF P- AND N-TYPE SI CRYSTALS.
AD-276 744 DIV. 8

BIBLIOGRAPHY ON THE THERMOMAGNETIC AND GALVANOMAGNETIC PROPERTIES AT TEMPERATURES UP TO 300 K, OF SEMICONDUCTORS AND SEMIMETALS.
AD-276 871 DIV. 17

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES, POLYMERIZATION SYNTHESIS, IR ATOMIC SPECTRA AR, HF, GE. LASER PROGRAM, NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 920 DIV. 25

THERMOELECTRIC PROPERTIES OF TUNGSTEN AND MOLYBDENUM DISELENIDES AND OF MOLYBDENUM DITELLURIDE.
AD-276 996 DIV. 14

***SEQUENTIAL ANALYSIS**

THE SEQUENTIAL ESTIMATION AND DETECTION OF SIGNALS IN GAUSSIAN NOISE IS TREATED BY THE METHODS OF MAXIMUM LIKELIHOOD.
AD-276 930 DIV. 8

TWO SEQUENTIAL TWO-SAMPLE GROUPED TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
AD-276 864 DIV. 15

***SHAPED CHARGES**

CUTTING AND DEMOLISHING USING HOLLOW EXPLOSIVE CHARGES; SELECTION OF CHARGE DESIGN; EFFECTIVE RANGE; TRANSPORTATION AND HANDLING; APPLICATIONS; (NAIL-DRIVING GUN).
AD-276 807 DIV. 22

***SHEETS**

OBSERVATIONS AND MEASUREMENTS OF STRAIN DISTRIBUTIONS AT THE BASE OF NOTCHES AND CRACKS IN THIN FLAT METAL SHEETS.
AD-276 923 DIV. 26

A SYSTEMATIC EVALUATION OF THE FUNDAMENTAL PARAMETERS GOVERNING FORMABILITY OF SHEET METALS AND ALLOYS.
AD-276 992 DIV. 26

***SHIP HULLS**

THE CONVERSION OF USNS MISSION CAPISTRANO (AG 162); FORMERLY (AG 112); TO AN ARTEMIS SUPPORT SHIP. STRUCTURAL INVESTIGATION OF THE HULL.
AD-276 994 DIV. 31

***SHIP PLATES**

THE CONVERSION OF USNS MISSION CAPISTRANO (AG 162); FORMERLY (AG 112); TO AN ARTEMIS SUPPORT SHIP. STRUCTURAL INVESTIGATION OF THE HULL.
AD-276 994 DIV. 31

***SHOCK WAVES**

STUDIES OF THE PHENOMENA OCCURRING IN AN ELECTROMAGNETIC SHOCK TUBE.
AD-276 650 DIV. 25

***SHORT TAKE-OFF PLANES**

LOW SPEED FREE AIR TESTS OF A POWERED .165 SCALE FOUR ENGINE TILT WING V/STOL MODEL.
AD-276 906 DIV. 1

***SILICON**

REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM GOLD-DOPED MONOCRYSTALLINE SILICON THERMISTORS; THERMAL STABILITY, RESISTIVITY, PROCESSING, PRODUCTION.
AD-276 659 DIV. 8

ELECTRONIC PROPERTIES OF CONTACTS ON SEMICONDUCTOR MATERIALS. SURFACE POTENTIALS AND RESISTANCE MEASUREMENTS ON ETCHED AND OXIDIZED SURFACES OF P- AND N-TYPE SI CRYSTALS.
AD-276 744 DIV. 8

TESTS TO DETERMINE THE SERVICE LIFE OF TYPE 1N540 SILICON RECTIFIERS.
AD-276 987 DIV. 8

*SILICON COATINGS

GLASS FABRIC FINISHES: REINFORCED PLASTICS - POLYESTER, PHENOLIC AND EPOXY RESINS: EFFECTIVENESS OF BONDING THE RESINS WITH CHLOROSILANE FINISHES HAVING APPROPRIATE FUNCTIONAL GROUPS.
AD-276 666 DIV. 14

*SILVER COMPOUNDS

POINT DEFECTS AND DISLOCATIONS IN SILVER CHLORIDE CRYSTALS.
AD-276 839 DIV. 25

*SIMULATION

SIMPAC: TOWARD A GENERAL SIMULATION CAPABILITY.
AD-276 991 DIV. 30

SIMPAC: A RESEARCH TOOL FOR SIMULATION.
AD-276 996 DIV. 30

COMPUTER SIMULATIONS OF A PERCEPTUAL LEARNING MODEL FOR SENSORY PATTERN RECOGNITION: CONCEPT FORMATION: AND SYMBOL TRANSFORMATION.
AD-276 703 DIV. 30

*SINGLE CRYSTALS

MAGNETIC SUSCEPTIBILITY AS A FUNCTION OF MICROWAVE MAGNETIC FIELD INTENSITY OF SINGLE-CRYSTAL FERRITES WITH PLANAR ANISOTROPY.
AD-276 999 DIV. 14

REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM GOLD-DOPED MONOCRYSTALLINE SILICON THERMISTORS: THERMAL STABILITY, RESISTIVITY: PROCESSING: PRODUCTION.
AD-276 659 DIV. 8

EFFECT OF METAL ADDITIVES ON THE HYDROGEN OVERVOLTAGE OF CU POLYCRYSTALLINE AND SINGLE CRYSTAL CATHODES, ADDITIVES - CD: AS: SB: AND IN.
AD-276 870 DIV. 6

THE GROWTH OF IRON SINGLE CRYSTALS AND THE ROLE OF DISLOCATIONS.
AD-276 901 DIV. 17

*SLOT ANTENNAS

STUDY OF METHODS OF MEASURING POWER DENSITY. APPLICATION OF SLOT ANTENNAS TO POWER DENSITY MEASUREMENT.
AD-276 922 DIV. 8

*SNOW

DRILL-HOLE MEASUREMENTS AND SNOW STUDIES AT BYRD STATION: ANTARCTICA.
AD-276 606 DIV. 2

*SOCIAL COMMUNICATION

THE COMPUTER AS A TOOL FOR DEVELOPMENT OF SOCIOLOGICAL THEORY.
AD-276 946 DIV. 32

*SOILS

ABSTRACTS OF REPORTS PUBLISHED BY ARMY MOBILITY RESEARCH CENTER. TRAFFICABILITY OF SOILS.
AD-276 700 DIV. 13

MEASUREMENT OF SOIL CARBON DIOXIDE AND ITS DIFFUSION INTO THE ATMOSPHERE.
AD-276 800 DIV. 32

*SOLAR CELLS

WAYS AND MEANS OF CONSTRUCTING DEVELOPMENTAL MODELS OF A CLOSE-SPACED: THIN SOLAR POWER CONVERTER USING THE PHOTOEMISSIVE PRINCIPLE.
AD-276 998 DIV. 8

*SOLENOIDS

SUPERCONDUCTIVITY AND SUPERCONDUCTING ELECTROMAGNETS MATERIALS AND PROPERTIES: BARDEEN-COOPER-SHRIEFFER THEORY: SUPERCONDUCTING DEVICES: ELECTROMAGNETS: HIGH-FIELD SOLENOID CALCULATION.
AD-276 979 DIV. 25

*SOLUTIONS

A BIBLIOGRAPHY OF HIGH PRESSURE TECHNIQUES AND PHENOMENA: CHEMICAL AND PHYSICAL. CRYSTAL GROWTH IN SOLUTIONS AT HIGH TEMPERATURE AND PRESSURE. OVER 2,000 REFERENCES.
AD-276 941 DIV. 25

*SOUND REPRODUCTION SYSTEMS

A BALLISTICS RANGE STATION IDENTIFICATION SYSTEM TO BE USED IN CONJUNCTION WITH A DATA RECORDER-REPRODUCER: FINAL READOUT IS PRESENTED VISUALLY AND IS AUTOMATICALLY PRINTED OUT BY A FLEXOWRITER.
AD-276 910 DIV. 30

*SOUND TRANSMISSION

HIGH-FREQUENCY ELECTROSTATIC TRANSDUCERS FOR USE IN GASES.
AD-276 637 DIV. 8

*SOUNDING ROCKETS

HASP (HIGH ALTITUDE SOUNDING PROJECTILE)! LAUNCHED FROM 5-INCH GUNS. A MODIFIED ANTIAIRCRAFT ROCKET (LOKI)! ONE VERSION IS CHAFF-LOADED FOR RADAR TRACKING TO DETERMINE WIND SPEED AND WIND DIRECTION.
AD-276 911 DIV. 22

EQUATIONS OF MOTION DESCRIBING THE POSITION IN SPACE, PITCH, YAW AND ROLL OF AN UNGUIDED ROCKET. VECTOR FORCES AND MOMENTS ARE DEFINED. NUMERICAL INTEGRATION OF THESE EQUATIONS IS DISCUSSED.
AD-276 971 DIV. 22

*SPACE ENVIRONMENTAL CONDITIONS

THE PRECESSION OF SPINNING BODIES DUE TO GRAVITATIONAL GRADIENT TORQUES.
AD-276 938 DIV. 25

STRUCTURAL FEASIBILITY OF FLYWHEELS TO BE USED AS CENTRIFUGAL ACCELERATORS.
AD-276 968 DIV. 30

ENVIRONMENTAL CONTROL FOR SPACE VEHICLES. ANALYSIS OF DIRECT SOLAR RADIATION: PLANETARY ALBEDO: AND PLANETARY THERMAL RADIATION FOR SPHERICAL, HEMISPHERICAL, CYLINDRICAL AND FLAT PLATES, AND OF INTERNAL HEAT LOADS.
AD-276 855 DIV. 12

EFFECTS OF SIMULATED SPACE ENVIRONMENT ON ELECTRICAL PROPERTIES OF SOLID INSULATING MATERIALS.
AD-276 867 DIV. 10

*SPACESHIPS

RESULTS OF STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING FOR TWO HYPOTHETICAL: OPTICAL: SPACE COMMUNICATIONS LINKS. SERVO TRACKING LOOP DESIGN AND ACQUISITION AND TRACKING SENSITIVITY ARE AMONG ITEMS DISCUSSED.
AD-276 964 DIV. 9

DISCUSSION OF STRUCTURAL DESIGN REQUIREMENTS AND ANALYSIS OF ROCKETS: MISSILES: AND SPACECRAFT IS REPORTED.
AD-276 678 DIV. 12

*SPECIAL FUNCTIONS

THE INTERACTION MECHANICAL RADIATION IMPEDANCE BETWEEN TWO PISTONS ARBITRARILY ORIENTED IN SPACE WITHOUT A BAFFLE.
AD-276 656 DIV. 25

*SPEECH

DESIGN CONSTRUCTION: AND CHECK-OUT OF AN EXPERIMENTAL MODEL FORMANT VOCODER SPEECH COMPRESSION SYSTEM.
AD-276 694 DIV. 9

*SPEECH TRANSMISSION

DESIGN CONSTRUCTION: AND CHECK-OUT OF AN EXPERIMENTAL MODEL FORMANT VOCODER SPEECH COMPRESSION SYSTEM.
AD-276 694 DIV. 9

*SPHERES

GRINDING AND POLISHING OF HARD MATERIALS SUCH AS YTTRIUM-IRON GARNET FOR FERROMAGNETIC MICROWAVE AMPLIFIERS.
AD-276 984 DIV. 26

*STABILITY

''INSTABILITY'' INTRODUCED BY THE CHOICE OF ALGORITHM.
AD-276 990 DIV. 15

*STANDING WAVE INDICATORS

A DESCRIPTION IS GIVEN OF AN AUTOMATIC WAVEGUIDE MEASURING INSTRUMENT WHICH DISPLAYS K-BAND REFLECTION FACTORS ON AN OSCILLOSCOPE. USSR.
AD-276 704 DIV. 30

*STATISTICAL DISTRIBUTIONS

THE PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS.
AD-276 978 DIV. 2

*STATISTICAL PROCESSES

THE USE OF STATISTICAL PROCESSES AND QUADRATIC FORMS TO ESTIMATE THE POWER SPECTRUM AND COVARIANCES.
AD-276 628 DIV. 25

*STATISTICAL TESTS

TWO SEQUENTIAL TWO-SAMPLE GROUPED TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
AD-276 864 DIV. 15

STATISTICAL TESTS ON SEVERAL DISTINCT HYPOTHESES OF DECISION PROBLEMS.
AD-276 980 DIV. 15

*STEEL

STRESS CORROSION TEST DATA ON ROCKET CASE MATERIALS UNDER SYNTHETIC ENVIRONMENTS.
AD-276 644 DIV. 17

*STORAGE BATTERIES

DEVELOPMENT OF SEALED SILVER OXIDE-ZINC SECONDARY CELL CAPABLE OF DELIVERING 500 TWO-HOUR CYCLES AT TEMPERATURES BETWEEN 0 AND 100 F.
AD-276 649 DIV. 7

*STORAGE TUBES

RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IAYRON DIRECT VIEW STORAGE TUBES.
AD-276 897 DIV. 8

*STRATUS CLOUDS

EXPERIMENTS IN CLOUD DISSIPATION FOR MODIFICATION OF GREENLAND WHITEOUTS.
AD-276 608 DIV. 2

*STRESS (PHYSIOLOGY)

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 28

*STRESS (PSYCHOLOGY)

MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS: AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY.
AD-276 829 DIV. 28

*STRESSES

A GENERALIZED THEORY OF ELASTIC DISLOCATION IS APPLIED TO A DUAL RADIAL CUT PROBLEM TO JUSTIFY THE SUPERPOSITION PRINCIPLE.
AD-276 749 DIV. 25

ON THE PROPAGATION OF STRESS WAVES IN A RATE SENSITIVE PLASTIC MEDIUM.
AD-276 841 DIV. 25

*STRUCTURES

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME: KNEE TYPE: STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 657 DIV. 13

DISCUSSION OF STRUCTURAL DESIGN REQUIREMENTS AND ANALYSIS OF ROCKETS, MISSILES: AND SPACECRAFT IS REPORTED.
AD-276 678 DIV. 12

*SUBSONIC FLOW

CALCULATION OF SUBSONIC CAVITIES WITH SONIC FREE STREAMLINES.
AD-276 944 DIV. 9

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 674 DIV. 9

*SULFUR

THE DEPENDENCE OF THE ELECTRICAL CONDUCTIVITY OF SULFUR UPON PRESSURE IS USED TO MEASURE A PRESSURE-TIME PROFILE FOR DETONATING BARATOL.
AD-276 986 DIV. 22

*SULFUR COMPOUNDS

SYNTHESIS OF HIGH TEMPERATURE STABLE INORGANIC POLYMERS CONTAINING CATENATED TRIAZINE RINGS AND P-S-N BONDS.
AD-276 926 DIV. 4

*SUPERCONDUCTIVITY

A FLUX PUMP FOR AMPLIFYING MAGNETIC FIELDS. POSSIBLE APPLICATIONS.
AD-276 989 DIV. 25

SUPERCONDUCTIVITY AND SUPERCONDUCTING ELECTROMAGNETS MATERIALS AND PROPERTIES: BARDEEN-

COOPER-SHRIEFFER THEORY; SUPERCONDUCTING DEVICES; ELECTROMAGNETS; HIGH-FIELD SOLENOID CALCULATION.
AD-276 979 DIV. 25

*SUPERCONDUCTORS

SUPERCONDUCTIVITY AND SUPERCONDUCTING ELECTROMAGNETS MATERIALS AND PROPERTIES; BARDEEN-COOPER-SHRIEFFER THEORY; SUPERCONDUCTING DEVICES; ELECTROMAGNETS; HIGH-FIELD SOLENOID CALCULATION.
AD-276 979 DIV. 25

*SUPERSONIC FLOW

LINEARIZED SUPERSONIC FLOW OF AN AXISYMMETRIC JET IN A SUPERSONIC STREAM IS ANALYZED BY MEANS OF PARTICULAR SINGULARITIES CALLED PSEUDOSOURCES.
AD-276 889 DIV. 9

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 876 DIV. 9

*SUPERSONIC PLANES

NOSE AND INLET SHAPES OF MINIMUM DRAG IN SUPERSONIC FLOW.
AD-276 819 DIV. 9

*SYMPOSIA

PAPERS ARE PRESENTED ON THE APPLICATION OF MULTIVARIATE METHODS TO SUBSTANTIVE PROBLEMS. OTHER PAPERS ARE ON LOGIC AND MATHEMATICS. THE PROBLEMS DISCUSSED ARE MAINLY IN THE AREA OF BEHAVIOR AND PERSONALITY TESTING.
AD-276 667 DIV. 28

*SYNTHETIC FIBERS

RECENT WORLDWIDE TECHNOLOGICAL ADVANCES IN POLYMERS: PLASTICS; SYNTHETIC FIBERS; ORGANIC AND INORGANIC MATERIALS; AND METALS.
AD-276 621 DIV. 14

*SYNTHETIC RUBBER

PLASTICS AND ELASTOMERS; SHOCK RESISTANCE TO SUDDENLY APPLIED LOADS; SIX ELASTOMERIC AND 11 RIGID PLASTIC CONICAL SPECIMENS WERE SUBJECTED TO SHOCKS GENERATED BY PBN3 DETONATED AT THEIR BASE. AN ARCTIC SBR ELASTOMER SHOWED UNUSUAL RESISTANCE.
AD-276 983 DIV. 14

POLY(ETHYLENE TETRASULFIDE) POLYMERS; STRESS RELAXATION; SPECIFIC RATE CONSTANT FOR BOND INTERCHANGE; ACTIVATION ENERGY.
AD-276 991 DIV. 4

*TANTALUM

THERMIONIC EMITTER MATERIALS; TA AND MO EMITTERS; CURRENT VOLTAGE CURVES; ION CURRENT MEASUREMENTS; PARAMETRIC CURVES.
AD-276 984 DIV. 8

*TARGET POSITION INDICATORS

DISPLAY-CONTROL SYSTEMS AND OPERATOR PERFORMANCE DURING TARGET ACQUISITION AND TRACKING USING 3 DIMENSIONS OF INFORMATION PRESENTED ON 2-DIMENSIONAL DISPLAY SURFACES.
AD-276 904 DIV. 28

*TARGET RECOGNITION

EFFECTIVENESS OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK; TWO EXPERIMENTS WHICH TESTED EFFECTIVENESS OF A READ-THROUGH TRAINING PROGRAM; CONBATTING INEFFICIENCY.
AD-276 947 DIV. 23

*TELEMETER SYSTEMS

MINUTES OF THE 2ND MEETING OF THE USERS TELEMETRY TRANSDUCERS WORKSHOP; IRIG; 25-26 JULY 1961; HOLLOMAN AFB; NEW MEXICO.
AD-276 639 DIV. 6

*TELEPHONE CABLES

AN ANALYSIS OF THE MEANS OF AIR-LAYING WIRES AND CABLES WITH SUFFICIENT SLACK.
AD-276 618 DIV. 5

*TELLURIDES

THERMOELECTRIC PROPERTIES OF TUNGSTEN AND MOLYBDENUM DISELENIDES AND OF MOLYBDENUM DITELLURIDE.
AD-276 996 DIV. 14

*TEMPERATURE

A BIBLIOGRAPHY OF HIGH PRESSURE TECHNIQUES AND PHENOMENA: CHEMICAL AND PHYSICAL. CRYSTAL GROWTH IN SOLUTIONS AT HIGH TEMPERATURE AND PRESSURE. OVER 2,000 REFERENCES.
AD-276 941 DIV. 25

*TEMPERATURE CONTROL

ENVIRONMENTAL CONTROL FOR SPACE VEHICLES. ANALYSIS OF DIRECT SOLAR RADIATION; PLANETARY ALBEDO; AND PLANETARY THERMAL RADIATION FOR SPHERICAL, HEMISPHERICAL, CYLINDRICAL AND FLAT PLATES; AND OF INTERNAL HEAT LOADS.
AD-276 888 DIV. 12

*TERRESTRIAL MAGNETISM

VERTICAL DRIFS OF THE F-LAYER DURING ''NEGATIVE'' EARTH MAGNETIC BAY DISTURBANCES.
AD-276 706 DIV. 25

*TEST EQUIPMENT

APPARATUS AND METHODS FOR THE STEAM STERILIZATION OF FOOD FOR GERMFREE LABORATORY ANIMALS. INVESTIGATION OF THE PRACTICAL APPLICATION OF GNOTOBIOTIC TECHNOLOGY TO THE IMPROVEMENT OF BREEDING COLONIES.
AD-276 619 DIV. 16

*TEST FACILITIES

A BALLISTICS RANGE STATION IDENTIFICATION SYSTEM TO BE USED IN CONJUNCTION WITH A DATA RECORDER-REPRODUCER; FINAL READOUT IS PRESENTED VISUALLY AND IS AUTOMATICALLY PRINTED OUT BY A FLEXOWRITER.
AD-276 910 DIV. 30

*TEST SETS

A MONITORING DEVICE FOR DETECTING THE DURATION OF SWITCH CHATTER WAS SUCCESSFULLY TESTED.
AD-276 982 DIV. 30

A DESCRIPTION IS GIVEN OF AN AUTOMATIC WAVEGUIDE MEASURING INSTRUMENT WHICH DISPLAYS K-BAND REFLECTION FACTORS ON AN OSCILLOSCOPE. USSR.
AD-276 706 DIV. 30

*TEXTILES

MATHEMATICAL ANALYSIS OF TRANSIENT THERMAL VARIATION IN CLOTHING. DETERMINATION OF HEAT CONDUCTION ACROSS NON-HOMOGENEOUS LAYERS OF CLOTH.
AD-276 636 DIV. 29

*THERMAL INSULATION

MODULUS OF RUPTURE; CRUSHING STRENGTH; THERMAL CONDUCTIVITY; AND THERMAL EXPOSURE TEST DATA ON ALUMINA AND ZIRCONIA FOAMS.
AD-276 983 DIV. 14

*THERMAL NEUTRONS

COBALT GLASS DOSIMETERS WERE USED TO MEASURE THERMAL NEUTRON FIELDS IN THE PRESENCE OF A FAST NEUTRON FIELD.
AD-276 662 DIV. 6

*THERMAL STRESSES

BOUSSINESQ'S PROBLEM FOR A HEATED PUNCH II. SOLUTION FOR A CYLINDRICAL PUNCH. III. SOLUTION FOR A CONICAL PUNCH.
AD-276 967 DIV. 25

*THERMIONIC EMISSION

THERMIONIC EMITTER MATERIALS; TA AND MO EMITTERS; CURRENT VOLTAGE CURVES; ION CURRENT MEASUREMENTS; PARAMETRIC CURVES.
AD-276 984 DIV. 8

*THERMISTORS

REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM GOLD-DOPED MONOCRYSTALLINE SILICON THERMISTORS; THERMAL STABILITY; RESISTIVITY; PROCESSING; PRODUCTION.
AD-276 689 DIV. 8

*THERMODYNAMICS

THE CALCULATION OF THERMODYNAMIC PROPERTIES OF GASES AT HIGH TEMPERATURES.
AD-276 982 DIV. 25

*THERMOELECTRICITY

THERMOELECTRIC PROPERTIES OF TUNGSTEN AND MOLYBDENUM DISELENIDES AND OF MOLYBDENUM DITELLURIDE.
AD-276 996 DIV. 14

*THERMOSETTING RESINS

THERMOSETTING POLYMERS; SENSITIVITY OF ELECTRICAL VOLUME RESISTANCE TO STRUCTURE - MAGNITUDE AND TEMPERATURE DEPENDENCE OF RESISTIVITY; GLASS TRANSITION; THERMAL STABILITY.
AD-276 979 DIV. 14

PLASTICS AND ELASTOMERS; SHOCK RESISTANCE TO SUDDENLY APPLIED LOADS; SIX ELASTOMERIC AND 11 RIGID PLASTIC CONICAL SPECIMENS WERE SUBJECTED TO SHOCKS GENERATED BY PBN3 DETONATED AT THEIR BASE. AN ARCTIC SBR ELASTOMER SHOWED UNUSUAL RESISTANCE.
AD-276 983 DIV. 14

*THREE DIMENSIONAL DISPLAY SYSTEMS

DISPLAY-CONTROL SYSTEMS AND OPERATOR PERFORMANCE DURING TARGET ACQUISITION AND TRACKING USING 3 DIMENSIONS OF INFORMATION PRESENTED ON 2-DIMENSIONAL DISPLAY SURFACES.
AD-276 904 DIV. 28

*THUNDERCLOUDS

AIRCRAFT PROTECTION FROM THUNDERSTORM ELECTROMAGNETIC EFFECTS - FIN CAP AND RADOME ANTENNA SYSTEM.
AD-276 641 DIV. 1

*TIME

OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS).
AD-276 881 DIV. 7

*TIME INTERVAL COUNTERS

ELECTRONIC TIME-DELAY AND DOUBLE-PULSE GENERATOR ARE DESCRIBED; THE UNIT ENERGIES 2 ELECTRIC EXPLOSIVE INITIATORS WITH AN ACCURATE TIME INTERVAL BETWEEN INITIATIONS THAT IS VARIABLE BETWEEN 2 AND 102 MSEC.
AD-276 840 DIV. 22

*TITANIUM

HISTORICAL REVIEW OF RESEARCH, ENGINEERING, AND DEVELOPMENT PROGRAMS ON TITANIUM AND TITANIUM ALLOYS BY ARMY ORDNANCE CORPS.
AD-276 693 DIV. 17

*TITANIUM ALLOYS

HISTORICAL REVIEW OF RESEARCH, ENGINEERING, AND DEVELOPMENT PROGRAMS ON TITANIUM AND TITANIUM ALLOYS BY ARMY ORDNANCE CORPS.
AD-276 693 DIV. 17

*TOPOLOGY

SIMPLE SINGULARITIES OF MAPS.
AD-276 858 DIV. 15

*TOXICITY

THE EFFECTS OF BE ABSORPTION ARE DESCRIBED; SPECIFIC MEASURES DESIGNED TO PREVENT ILLNESS AND MAINTAIN HEALTH AMONG PERSONS WORKING WITH BE ARE GIVEN; MEDICAL PROGRAM; BIBLIOGRAPHY.
AD-276 640 DIV. 14

*TRACKING

TRACKING TASKS AS ACCURATE INDICATORS OF STRESSES ON HUMAN BEINGS.
AD-276 698 DIV. 28

*TRAINING

A ''FOLLOW-BACK'' TECHNIQUE WAS EMPLOYED TO VALIDATE THE SEVERAL PHASE GRADES IN ELECTRICIAN'S MATE A AND IN ELECTRICITY AND ELECTRONICS ''P'' SCHOOLS AGAINST AN 8-PART PERFORMANCE TEST. RESULTS WERE INCONCLUSIVE.
AD-276 923 DIV. 23

*TRAINING DEVICES

A PLAN FOR MODELING A SCHOOL SYSTEM ON A DIGITAL COMPUTER, AUTOMATION OF THE LEARNING PROCESS BY ELIMINATING STUDENTS, STRUCTURING OF THE SCHOOL CURRICULUM AND TRAINING OF TEACHERS. REPRESENTATION OF A LEARNING THEORY.
AD-276 992 DIV. 28

*TRANSDUCERS

HIGH-FREQUENCY ELECTROSTATIC TRANSDUCERS FOR USE IN GASES.
AD-276 637 DIV. 8

MINUTES OF THE 2ND MEETING OF THE USERS TELEMETRY TRANSDUCERS WORKSHOP; IRIG; 25-26 JULY 1961; HOLLOMAN AFB; NEW MEXICO.
AD-276 639 DIV. 6

TWO ELECTROMECHANICAL GYRATOR DESIGNS; WITH COUPLED PIEZOELECTRIC AND PIEZOMAGNETIC TRANSDUCERS; WERE USED TO COVER THE FREQUENCY RANGE; 375C-1MC. LOW FREQUENCY HALL EFFECT GYRATOR OR MULTITERMINAL DEVICES. NEUTRALIZATION OF ELECTROMECHANICAL GYRATORS TO FORM ISOLATORS.
AD-276 845 DIV. 8

*TRANSFORMATIONS (MATHEMATICS)

AN ANALYTIC PROOF THAT THE HOHMANN-TYPE TRANSFER IS THE TRUE MINIMUM TWO-IMPULSE TRANSFER.
AD-276 686 DIV. 15

*TRANSISTOR AMPLIFIERS

A STUDY OF THE EFFECTS OF VARIATION IN TRANSISTORS AND OTHER COMPONENT PARAMETERS ON THE CIRCUIT PERFORMANCE OF GENERAL USAGE ASSEMBLIES; DATA ARE PRESENTED ON THE CONTROL OF PRIMARY DESIGN FACTORS EFFECTING CIRCUIT RELIABILITY.
AD-276 826 DIV. 8

*TRANSISTORS

AN INDUSTRIAL CAPABILITY TO MANUFACTURE A 300 WATT SILICON AUDIO TRANSISTOR IS BEING ESTABLISHED. A SAMPLE DEVICE WAS CONSTRUCTED AND FABRICATION TECHNIQUES ARE PRESENTED.
AD-276 674 DIV. 8

A STUDY OF THE EFFECTS OF VARIATION IN TRANSISTORS AND OTHER COMPONENT PARAMETERS ON THE CIRCUIT PERFORMANCE OF GENERAL USAGE ASSEMBLIES. DATA ARE PRESENTED ON THE CONTROL OF PRIMARY DESIGN FACTORS EFFECTING CIRCUIT RELIABILITY.
AD-276 826 DIV. 8

***TRANSMISSION LINES**

TWO ELECTROMECHANICAL GYRATOR DESIGNS, WITH COUPLED PIEZOELECTRIC AND PIEZOMAGNETIC TRANSDUCERS, WERE USED TO COVER THE FREQUENCY RANGE, 375C-1MC. LOW FREQUENCY HALL EFFECT GYRATOR OR MULTITERMINAL DEVICES. NEUTRALIZATION OF ELECTROMECHANICAL GYRATORS TO FORM ISOLATORS.
AD-276 845 DIV. 8

HIGH TEMPERATURE POLYMERS; PHOSPHONITRILE RING OPENING STUDIES. POLYMERIZATION SYNTHESIS. IR ATOMIC SPECTRA AR, HF, GE. LASER PROGRAM. NONLINEAR TRANSMISSION LINES. SEMICONDUCTOR PHYSICS. SMALL ANTENNA STUDY.
AD-276 920 DIV. 25

***TRAVELING WAVE TUBES**

A LINEAR THEORY IS DEVELOPED FOR TRAVELING-WAVE TUBES WHICH IS BASED UPON A PERIODIC MODEL FOR THE SLOW-WAVE STRUCTURE.
AD-276 730 DIV. 8

***TRIAZINES**

SYNTHESIS OF HIGH TEMPERATURE STABLE INORGANIC POLYMERS CONTAINING CATENATED TRIAZINE RINGS AND P-S-N BONDS.
AD-276 924 DIV. 4

***TUNGSTEN**

REFLECTION AND DISSOCIATION OF MOLECULAR HYDROGEN ON TUNGSTEN.
AD-276 849 DIV. 25

***TURBULENT FLOW**

AN EXPERIMENTAL STUDY OF THE DECAY OF TURBULENT ENERGY IN SEVERAL GASES AND AT HIGH AND LOW DENSITY.
AD-276 921 DIV. 9

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 874 DIV. 9

***ULTRASONIC RADIATION**

POINT-CONTACT TRANSDUCERS FOR ULTRASONIC TESTING. THE FEASIBILITY WAS INVESTIGATED OF EMPLOYING POINT SHAPED ULTRASONIC TRANSDUCERS WHICH DIRECTLY AMPLIFY THE DETECTED ULTRASONIC SIGNAL.
AD-276 965 DIV. 30

***ULTRASONICS**

POINT-CONTACT TRANSDUCERS FOR ULTRASONIC TESTING. THE FEASIBILITY WAS INVESTIGATED OF EMPLOYING POINT SHAPED ULTRASONIC TRANSDUCERS WHICH DIRECTLY AMPLIFY THE DETECTED ULTRASONIC SIGNAL.
AD-276 965 DIV. 30

***ULTRAVIOLET RADIATION**

MEASUREMENTS OF THE CORRELATION BETWEEN THE FLUCTUATING VELOCITIES AND THE FLUCTUATING WALL PRESSURE IN A THICK TURBULENT BOUNDARY LAYER.
AD-276 901 DIV. 9

***UNDERGROUND STRUCTURES**

METEOROLOGICAL-GEOLOGICAL INVESTIGATIONS OF THE SUPAI KI BLOWHOLE SYSTEM IN NORTH CENTRAL ARIZONA.
AD-276 935 DIV. 2

***UNDERWATER SOUND GENERATORS**

PREDICTING SONIC PULSE SHAPES OF UNDERWATER SPARK DISCHARGES FOR USE IN MAPPING THE OCEAN BOTTOM.
AD-276 953 DIV. 25

***UNDERWATER SOUND TRANSMISSION**

REVIEW OF THE SHALLOW WATER PROPAGATION PROBLEM; ANALYSIS OF SOUND TRANSMISSION STUDIES; SOME DEEP WATER OBSERVATIONS ALSO INCLUDED.
AD-276 872 DIV. 25

***USSR**

THE PRESENT STATE OF DEVELOPMENT OF AUTOMATED ELECTRIC POWER SUPPLY IN THE USSR IS DISCUSSED.
AD-276 804 DIV. 7

ESTIMATES OF SOVIET NATIONAL INCOME AND PRODUCT AT CURRENT ESTABLISHED PRICES FOR THE YEARS 1956-1958 AND AT CURRENT ADJUSTED (TO CORRECT FOR DISTORTION CAUSED BY INDIRECT TAXES) PRICES FOR THE YEARS 1949-1958; THE SEVEN YEAR PLAN.
AD-276 933 DIV. 32

***VANADIUM ALLOYS**

FABRICABILITY AND MECHANICAL PROPERTY DATA FOR VANADIUM ALLOYS.
AD-276 955 DIV. 17

***VENUS**

RECONNAISSANCE OF THE NEARER PLANETS A SURVEY OF PLANETARY PROBLEMS IN THE SPACE AGE.
AD-276 833 DIV. 2

***VERTICAL TAKE-OFF PLANES**

LOW SPEED FREE AIR TESTS OF A POWERED .165 SCALE FOUR ENGINE TILT WING V/STOL MODEL.
AD-276 904 DIV. 1

***VISCOSITY**

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 874 DIV. 9

***VISION**

AN ARMED FORCES-NRC COMMITTEE REPORT ON VISUAL PROBLEMS OF SPACE TRAVEL. SPECIFIC CRITICAL VISUAL HAZARDS SUCH AS RADIATION; INHALATION AND ADSORPTION OF FUELS; GLARE. PROBLEMS ASSOCIATED WITH WEIGHTLESSNESS; VIGILANCE; EMPTY FIELD; CONTRAST; PERCEPTION OF MOTION. EXTENSIVE BIBLIOGRAPHY.
AD-276 913 DIV. 16

***VOICE COMMUNICATION SYSTEMS**

DESIGN CONSTRUCTION; AND CHECK-OUT OF AN EXPERIMENTAL MODEL FORMANT VOCODER SPEECH COMPRESSION SYSTEM.
AD-276 634 DIV. 5

***VULCANIZATES**

POLY(ETHYLENE TETRASULFIDE) POLYMERS; STRESS RELAXATION; SPECIFIC RATE CONSTANT FOR BOND INTERCHANGE; ACTIVATION ENERGY.
AD-276 991 DIV. 4

***WATER**

MEASUREMENT OF TEMPERATURE, SALINITY, AND VELOCITY OF WATER THROUGH ELECTROLYTIC CONDUCTIVITY MEASUREMENTS.
AD-276 787 DIV. 25

***WAVE ANALYSIS**

PREDICTING SONIC PULSE SHAPES OF UNDERWATER SPARK DISCHARGES FOR USE IN MAPPING THE OCEAN BOTTOM.
AD-276 953 DIV. 25

***WAVE TRANSMISSION**

WAVES ALONG HOMOGENEOUS PLASMA LAYERS.
AD-276 705 DIV. 25

***WAVEGUIDE COUPLERS**

AN INVESTIGATION WAS MADE OF THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE.
AD-276 643 DIV. 8

***WAVEGUIDE FILTERS**

DESIGN EXPRESSIONS FOR CRITICALLY COUPLED, BILATERALLY MATCHED FILTERS AT MICROWAVE FREQUENCIES.
AD-276 905 DIV. 8

***WAVEGUIDES**

AN INVESTIGATION WAS MADE OF THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE.
AD-276 643 DIV. 8

AN INVESTIGATION AND STUDY OF THE USE OF VARIOUS GAS DISCHARGE CONFINEMENT MECHANISMS TO BRING ABOUT IMPROVED PERFORMANCE OF GAS DISCHARGE DUPLEXERS AT HIGH POWER LEVELS.
AD-276 906 DIV. 25

***WEAPONS**

WEAPON SYSTEM CONCEPT; DEFINITION AND HISTORICAL EVOLUTION; INSTRUMENTATION.
AD-276 958 DIV. 18

***WELDED JOINTS**

STATIC AND DYNAMIC TESTS WERE CONDUCTED ON PORTAL-FRAME, KNEE TYPE, STRUCTURAL CONNECTIONS TO DETERMINE BLAST LOADINGS.
AD-276 697 DIV. 13

***WELL LOGGING**

DRILL-HOLE MEASUREMENTS AND SNOW STUDIES AT BYRD STATION, ANTARCTICA.
AD-276 606 DIV. 2

***WIND**

AGMC CLIMATOLOGICAL RINGBOOK. PART XVI EMPIRICAL FREQUENCY DISTRIBUTIONS OF WIND COMPONENTS AT CONSTANT ALTITUDE LEVELS, ALERT, ELLESMERE ISLAND, CANADA.
AD-276 710 DIV. 2

***WIND TUNNELS**

THE EFFECTS OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK.
AD-276 874 DIV. 9

***XENON LAMPS**

DESIGN AND MANUFACTURING REQUIREMENTS FOR REFLECTORS TO BE USED WITH HIGH-POWERED XENON LAMPS FOR STREET LIGHTING. USSR.
AD-276 801 DIV. 7

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-276 504 Div. 1, 9
(TISTA/WAW) OTS price $9.60

North American Aviation, Inc., Los Angeles, Calif.
LOW SPEED FREE AIR TESTS OF A POWERED .165 SCALE FOUR ENGINE TILT WING V/STOL MODEL.
26 Mar 62, 109p. incl. tables (Rept. no. NA 62H-211)
Unclassified report

DESCRIPTORS: *Vertical take-off planes, *Short take-off planes, *Convertible airplanes. Aerodynamics, Lift, Drag, Moments, Model tests, Tables.

AD-276 641 Div. 1
(TISTA/SEB) OTS price $3.60

Lightning and Transients Research Inst., Minneapolis, Minn.
AIRCRAFT PROTECTION FROM THUNDERSTORM ELECTROMAGNETIC EFFECTS - I (FIN CAP AND RADOME ANTENNA SYSTEM LIGHTNING PROTECTION),
by M. M. Newman and J. D. Robb. Mar 62, 29p. incl. illus. 16 refs. (L and T rept. no. 401)
(Contract AF 33(616)7828, Proj. 4357)
(ASD TDR 62-438) Unclassified report

DESCRIPTORS: *Thunderclouds - Aircraft, *Aviation safety - Storms. Lightning, Radomes, Electrical equipment, Antennas, High frequency, Very high frequency, Electromagnetic effects.

Thunderstorm lightning to aircraft reports from over 700 incidents are tabulated and, although the data on jets is not yet complete, show the greatest incidence of strikes to occur near 0 C and around 10,000 ft altitudes with some lightning incidents at 40,000 ft. Point-of-strike frequencies are also tabulated. Applications of artificial lightning generators and model studies to determine point-of-strike probabilities and reproduce natural lightning in-flight effects are discussed. Specific topics included are the use of HF lightning arresters to protect the antenna and radio equipment, and the use of graded resistance diverter rods to provide localized point-of-strike control. The development of radome protection is also discussed in detail with particular emphasis on foil strip protection systems and proper use of bonding wires. The extension of HF protection systems of VHF and UHF antennas, and possible fuel tank and fuel vent hazards from lightning discharges and the feasibility and need for an increased test facility to enable tests on full scale aircraft to be made more effectively are also discussed. (Author)

AD-276 873 Div. 1
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A CONTROLLED GLIDING PARACHUTE,
by A. M. Foteyev, I. L. Glushkov and others.
4 June 62, 5p. incl. illus. (Trans. no. FTD-TT-62-349 from Soviet Patent no. 35344 (642533/27) 29 Jan 60)
Unclassified report

DESCRIPTORS: *Parachutes. Design, Maneuverability, Parachute descents, Control systems, USSR.

The design of a controlled gliding parachute is described. The distinctive feature of the proposed device is that, to improve the maneuverability by making the symmetrically arranged shroud lines movable, the latter are made in 1 piece and passed through the buckles of the fixed straps attached to the joints; the movable straps have grooves for determining the neutral position. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-276 538 Div. 2, 30
(TISTA/WAW) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
IMPROVEMENTS AND CAPABILITY EXTENSION FOR THE IONOSPHERIC RESEARCH AIRCRAFT.
Final rept.,
by E. F. Vance and J. E. Nanevicz. Feb 62, 25p. incl. illus. 5 refs.
(Contract AF 19(604)7369, Proj. 8653)
(AFCRL 62-254) Unclassified report

DESCRIPTORS: *Precipitation static, *Ionosphere, *Ionospheric propagation, *Atmospheric sounding, *Antennas, *Loop antennas. Transport planes, Electric discharges, Reduction, Scientific research, Instrumentation, Radio receivers, High frequency, Mathematical analysis.

Means are described for reducing precipitation static interference on a KC-135 aircraft equipped with a refueling boom and with fixed-wire and other special HF antennas. A complement of ortho-decoupled dischargers is recommended, and special precautions to be observed in the design of antenna housings and fittings are discussed. Improvements in the electrical design for an airborne ionospheric-sounder receiving-antenna system for the 2-to-25 megacycle range are described. Single-turn, balanced elliptical-loop antennas with tuners and preamplifiers operating throughout the frequency range were designed for installation in the wing tips of the aircraft. A balanced triangular loop was designed for installation in the nose radar bay. In addition, a method of determining the gain of a three-wire transmit-receive antenna on the KC-135 aircraft is described. A summary of studies of a new method of determining the properties of the lower ionoshpere from airborne measurements is given. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-276 542 Div. 2
(TISTP/FR) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
THE INCORPORATION OF PHYSICAL PARAMETERS IN THE OBJECTIVE SPECIFICATION OF CLOUDINESS.
Final rept.,
by Paul A. Davis. Mar 62, 68p. incl. illus. 12 refs.
(Contract AF 19(604)7343, Proj. 8641)
(AFCRL 62-451) Unclassified report

DESCRIPTORS: *Clouds. Statistical analysis, Humidity, Meteorological charts.

It was desired to develop objective methods for specifying the existence of significant cloudiness (over 50 per cent coverage) on a regional scale at time of analysis. Attempts were made to determine meaningful relationships between visual and rawinsonde data in order to provide more usable information than would be obtainable from individual sources. (Author)

AD-276 603 Div. 2
(TISTP/DAW) OTS price $11.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STUDY OF ICE CLIFF IN NUNATARSSUAQ, GREENLAND,
by R. P. Goldthwait. Oct 60, 143p. incl. illus. tables (Technical rept. no. 39)
(Contract DA 11-190-eng-19, Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Ice. Glaciers, Greenland, Climatic factors, Geophysical prospecting.

The present activity and history of an ice cliff on the E. margin of North Ice Cap (near its junction with the main Greenland Ice Cap) and of adjacent glaciers are deduced on the basis of detailed glaciological, meteorological, geomorphological, and botanical studies in the summers of 1955 and 1956. Detailed descriptions are given of the climatic, ablation, and runoff regimes of the glacier; the motion of the ice-cliff surface, glacier surface, and base; the structure of the ice, including physical properties, foliation and fracture, crystal distortion and englacial strain.

AD-276 604 Div. 2
(TISTP/FR) OTS price $5.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
COMPOSITION OF SEA ICE AND ITS TENSILE STRENGTH,
by Andrew Assur. Dec 60, 53p. incl. illus. tables, refs. (Research rept. no. 44)
(Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Ice, *Salinity, *Sea water. Salts, Physical properties, Tensile properties.

Part of the salts contained in sea water are trapped in sea ice upon freezing. They form liquid and solid inclusions in a systematic pattern. The amount depends upon temperature and salinity. A detailed table of phase relations is given and a general theory is derived to show how the internal cavities may affect the strength of sea ice. The general theory leads to specific models. The principle of ring tensile strength tests is explained and a series for evaluation is given. Test data lead to a substantiation of theoretical principles and to an illustration of several hypotheses concerning the effect of solid salt inclusions upon strength. Observed sea ice phenomena are explained on the basis of internal structure. (Author)

AD-276 606 Div. 2
(TISTP/FR) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
DRILL-HOLE MEASUREMENTS AND SNOW STUDIES AT BYRD STATION, ANTARCTICA,
by A. J. Gow. Jan 61, 12p. incl. illus. tables, 11 refs. (Technical rept. no. 78)
(Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Snow, *Well logging, *Glaciers. Temperature, Density, Geophysical prospecting, Antarctic regions.

Closure, temperature and inclination were measured in a deep drill hole at Byrd Station, Antarctica. The deep hole was drilled to 1013 ft during the 1957-58 summer season, and was first fully instrumented in December 1958. The results of remeasurement in January 1960 and January 1961 indicate that temperatures in the uncased portion of the deep hole (below 150 ft) have stabilized; that the closure rate is increasing; and that insignificant inclination has occurred since the hole was drilled 3 yr ago. Results of snow studies in January 1960 show that the present rate of accumulation at Byrd Station is between 14 and 15 cm of water equivalent per year. (Author)

AD-276 607 Div. 2
(TISTP/FR) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE APPLICABILITY OF SEISMIC REFRACTION SOUNDINGS IN PERMAFROST NEAR THULE, GREENLAND,
by Hans Roethlisberger. Feb 61, 33p. incl. illus. tables, 12 refs. (Technical rept. no. 81)
(Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Ice, *Permafrost, *Seismic waves, Velocity, Refraction, Reflection, Glaciers, Geophysical prospecting, Greenland.

The applicability of the seismic refraction method for engineering purposes was investigated in the Thule area of Greenland. Special attention was given to the cases in which shallow ice overlies frozen ground and in which frozen glacial drift up to a few hundred feet thick overlies bedrock. Seismic velocities were measured in different types of sediments of the Thule formation and in the crystalline basement rock. The velocities in rock and frozen ground were generally high, cementation by ice being the most likely reason at the relatively low ground temperatures of about -10 C. It was found that, with comparable velocity discrimination, the refraction method gives more complete information in permafrost than in unfrozen material, since later seismic events can be identified on the records shortly after the first arrival. Later events also made wide angle reflection soundings possible at a depth as shallow as 200 ft. A nagative velocity gradient in the frozen ground is believed to be responsible for the rapid attenuation of the direct wave. (Author)

AD-276 608 Div. 2
(TISTP/FR) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EXPERIMENTS ON GREENLAND WHITEOUT MODIFICATION - 1960,
by James E. Jiusto and R. R. Rogers. Aug 61,

23p. incl. illus. tables, 9 refs. (Technical rept. no. 84)
(Contract DA-11-190-eng-100, Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Stratus clouds, *Artificial precipitation. Airplanes, Balloons, Rockets, Carbon dioxide, Solidified gases, Silver compounds, Iodides, Calcium compounds, Sodium compounds, Chlorides, Carbon black, Soils, Greenland.

A 2-month experimental program was conducted in Greenland to determine the extent to which arctic whiteouts and low clouds could be modified using cloud dissipation techniques. Seven seeding agents, applicable to supercooled or warmer-than-freezing clouds, were tried employing aircraft, tethered blimp-balloon, and rocket delivery. Successful dissipation of supercooled clouds was achieved with dry ice. As little as 5 lb of dry ice per mile, dispersed from aircraft, produced efficient clearing action and line openings up to 2.5 miles wide. An inexpensive seeding scheme, involving a tethered blimp-balloon and open baskets of dry ice attached at intervals along the tether line, was shown to be capable of opening holes in low cloud overcasts. Such a technique appears feasible for maintaining safe landing corridors at ice-cap airstrips during fog and low stratus conditions. Seeding materials that were ineffective in dissipating the supercooled clouds or warmer-than-freezing clouds encountered were liquid carbon dioxide, Greenland soil particles, silver iodide, carbon black, calcium chloride, and sodium chloride. Cloud hydrometeor and atmospheric nuclei measurements were made in relation to the modification tests. (Author)

AD-276 609 Div. 2
(TISTP/FR) OTS price $5.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE ANTARCTIC ICE SHEET. PART I: ENVIRONMENT, SECTION B: REGIONAL,
by Malcolm Mellor. Feb 61, 50p. incl. illus. tables, 65 refs. (Cold Regions Science and Engineering rept. I-B1)
(Proj. 8S66-02-001)
Unclassified report

DESCRIPTORS: *Ice, *Antarctic regions, *Glaciers. Snow, Melting, Temperature, Thickness, Plastic flow.

Antarctica consists of a continental-type land mass covered by a thick mantle of snow-formed ice. The land surface beneath the ice is below sea level in many places, but since troughs and basins are solidly filled with permanent ice, the rock depression is partly due to imposed ice load, and the earth's crust is of continental type, Antarctica can be regarded as a continent having some major basal troughs. The surface area of the continent and its fringing ice shelves is about 5,500,000 square miles. (Author)

AD-276 610 Div. 2
(TISTP/FR) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE GREENLAND ICE SHEET. PART I: ENVIRONMENT, SECTION B: REGIONAL,
by Henri Bader. Sep 61, 18p. incl. illus. table, 11 refs. (Cold Regions Science and Engineering rept. no. I-B2)
(Proj. 8S66-02-001)
Unclassified report

DESCRIPTORS: *Ice, *Greenland, *Glaciers, Snow, Melting, Temperature, Thickness, Plastic flow.

The mean elevation of the bed of the ice sheet is 620 m (2060 ft), and almost 1/3 of its area lies below sea level. The mean thickness of the ice sheet (equal to the difference between the mean elevations of surface and bed) is 1515 m (4970 ft). The ice volume is 2,600,000 cu km = 620,000 cu mi. The water equivalent is 2,350,000 cu km (560,000 cu mi). If distributed over the world's oceans, it would raise the sea level by 6.5 m (21 ft). The maximum thickness of the ice sheet is about 3000 m (10,000 ft). (Author)

AD-276 710 Div. 2
(TISTP/FR) OTS price $10.10

Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Ala.
AOMC CLIMATOLOGICAL RINGBOOK. PART XVI. EMPIRICAL FREQUENCY DISTRIBUTIONS OF WIND COMPONENTS AT CONSTANT ALTITUDE LEVELS. ALERT, ELLESMERE ISLAND, CANADA,
by Werner H. Alfuth and Armstead P. Alsobrook. 30 Oct 61, 121p. incl. tables (Rept. no. RR-TR-61-20)
Unclassified report

DESCRIPTORS: *Wind. Queen Elizabeth Islands, High altitude, Periodic variations, Statistical analysis, Tables, Handbooks.

This publication presents climatological parameters of scalar winds, zonal and meridional wind components, semiplanar winds and wind shear at 1 km altitude intervals for the location Alert, Ellesmere Island, Canada. The frequency distributions have been established for 12 monthly and the annual reference periods with values of cumulative percentage frequency corresponding to the mean and plus and minus one, two and three sigma levels of normal distribution. The statistical information is based on the observational period July 1953 - June 1958. (Author)

AD-276 812 Div. 2
(TISTP/JW) OTS price $6.60

Arctic Inst. of North America, Washington, D. C.
GLACIOLOGICAL STUDIES ON FLETCHER'S ICE ISLAND (T-3),
by Ukichiro Nakaya, Jiro Muguruma, and Keiji Higuchi. Mar 62, 60p. incl. illus. tables.
(Research paper no. 21; Scientific rept. no. 3)
(Contract AF 19(604)8343, Proj. 7628; Continuation of Contract AF 19(604)3073)
(AFCRL 62-464) Unclassified report

DESCRIPTORS: *Glaciers, *Ice. Crystals, Elasticity, Viscosity, Arctic regions, Hydrology, Geology.

Glaciological studies were made on T-3 of the ablation phenomena; the nature of candle ice, including c-axes distribution and histograms of candle lengths; the structure of stratified ice (ice composed of an aggregate of fairly large crystals with small-angle boundaries); and the crystallographic orientation of aggregates of component crystals. Core drilling was done through 34.7m of ice near camp, through 7.5m near Colby Bay, and through 4m-thick old pack ice in the Bay. A heavy dirt layer was observed at 8.4m. Crystallographic examinations, viscoelastic measurements, and chemical analyses were made all along the cores. Results indicate that the island body is composed of three strata: iced firn above the heavy dirt layer; basement ice (divided into four strata) below the dirt layer; and a 1.8m-thick sea ice at the bottom.

Division 2- ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-276 833 Div. 2
(TISTP/WH) OTS price $11.50

Air Force Office of Scientific Research, Washington, D. C.
RECONNAISSANCE OF THE NEARER PLANETS. A SURVEY OF PLANETARY PROBLEMS IN THE SPACE AGE,
by G. de Vaucouleurs. Nov 61, 141p. incl. illus. tables, refs. (Rept. no. AFOSR/DRA 61-1)
Unclassified report

DESCRIPTORS: *Mercury, *Venus, *Mars. *Astronomical observatories, Balloons, Space probes.

This discussion is divided into two parts: the first part is a summary of the best present information of the planets Mercury, Venus, and Mars, gained almost entirely from ground-based observatories. The second part outlines how these methods could be extended to observations from balloon observatories, and especially from space probes and orbiters in the immediate vicinity of the planets. (Author)

AD-276 879 Div. 2
(TISTP/FR) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INSTRUCTIONS FOR THE USE OF MUTUAL MOON VISIBILITY CHARTS,
by F. Nagy. 7 June 62, 5p. incl. illus. (Rept. no. 52G-3)
(Contract AF 19(604)7400)
(AFESD TDR 62-95) Unclassified report

DESCRIPTORS: *Moon. Visibility.

AD-276 903 Div. 2, 6
(TISTW/RD) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MAXIMUM-LIKELIHOOD ESTIMATION OF THE CORRELATION FUNCTION OF A THRESHOLD SIGNAL, AND ITS APPLICATION TO THE MEASUREMENT OF THE TARGET SCATTERING FUNCTION IN RADAR ASTRONOMY,
by Robert Price. 25 May 62, 31p. 7 refs.
(Rept. no. 34 G-4)
(Contract AF 19(604)7400)
(AFESD TDR 62-92) Unclassified report

DESCRIPTORS: *Radio astronomy. Radar signals, Scattering, Radar targets, Statistical functions, Mathematical analysis, Radar analysis, Signal-to-noise ratio, Radar reflections, Detection.

The maximum-likelihood estimate is derived of the signal correlation function under threshold conditions, where the signal is weak relative to the noise in a sense that will be defined. Such threshold conditions are to be expected in radar astronomy. Also, concentrating on the radar astronomy environment (or on any environment that is characterized by a propagation medium having mutually independent, statistically stationary fluctuations at a multiplicity of delays), the maximum-likelihood estimate of the 'scattering function' of the target is deduced. (Author)

AD-276 935 Div. 2
(TISTP/FR) OTS price $4.60

RAND Corp., Santa Monica, Calif.
METEOROLOGICAL-GEOLOGICAL INVESTIGATIONS OF THE WUPATKI BLOWHOLE SYSTEM.
Final rept.,
by J. D. Sartor and D. L. Lamar. June 62, 41p. incl. illus. tables, 13 refs. (Memo. no. RM-3139-RC)
Unclassified report

DESCRIPTORS: *Underground structures, *Geology. Wind, Barometric pressure, Arizona.

Using meteorological and geological methods, a vast, inaccessible underground system of cavities in the Wupatki area of north central Arizona was investigated. The existence of some form of underground cavity is betrayed by drafts of wind, alternately entering and emerging from small blowholes and dry wells in the area. The blowhole-and-cavity system appears to be associated with fault fissures and solution-formed passages in the thick beds of the local Kaibab limestone and Coconino sandstone. By comparing the air intake and output of the blowholes with barometric pressure, the investigators estimated that the cavity had a volume of at least seven billion cubic feet. Tracers proved the interconnection of blowholes in areas at least 24 miles apart. A gravity survey indicated the absence of large caverns (in the local area, at least), suggesting rather, sinuous or multiply branched passages linking the holes and wells. Besides developing a research tool of various potential uses, the project indicated a possible relationship between the system of caverns and the underground water drainage of the Flagstaff-Wupatki region. (Author)

AD-276 967 Div. 2
(TISTP/FR) OTS price $12.00

Washington U., Seattle.
PHYSICAL AND CHEMICAL DATA FOR SOUTHERN PUGET SOUND, AUGUST 1957 - OCTOBER 1958,
comp. by E. E. Collias, J. Dermody, and C. A. Barnes. Mar 62, 151p. incl. illus. tables.
(Technical rept. no. 67; Ref. no. M62-8)
(Contract Nonr-47710, Proj. NR 083 012)
Unclassified report

DESCRIPTORS: *Oceanographical data, *Puget Sound. Temperature, Salinity, Density, Oxygen, Phosphates, Sulfites, River currents, Estuaries.

Physical and chemical observations are summarized which were made at various locations in southern Puget Sound by the University of Washington, Department of Oceanography during the period from August 1957 to October 1958. Charts show the positions of the stations sampled. Values for temperature, salinity, dissolved oxygen and dissolved inorganic phosphate are given at selected depths from the surface to bottom. (Author)

AD-276 978 Div. 2
(TISTP/TL) OTS price $2.25

Aeronautical Chart and Information Center, St. Louis, Mo.
PRINCIPLES OF ERROR THEORY AND CARTOGRAPHIC APPLICATIONS,
by Clyde R. Greenwalt and Melvin E. Shultz. Feb 62, 1v. incl. illus. tables, 29 refs. (ACIC technical rept. no. 96)
Unclassified report

DESCRIPTORS: *Mapping, *Errors, *Probability, *Statistical distributions, *Geodesics. Theory, Indexes, Data, Tables, Partial differential equations.

One of the most useful contributions of error theory is the precision index which identifies the error distribution and specifies the probability that the true error in a quantity does not exceed a certain value. This situation is applicable to the evaluation of map and geodetic information, in that it makes possible meaningful accuracy statements having uniform interpretation, and is compatible with established map

accuracy standards which specify limits of permissible error in various categories. Standardized procedures and supporting theory for computing linear, circular, and spherical precision indexes are presented. The recommended procedure for computing the circular or spherical standard error from linear standard errors in X and Y, or X, Y, and Z directions, respectively, is to average the linear standard errors. Other precision indexes in the same error distribution are easily computed from the linear, circular, and spherical standard errors -- the most important precision indexes. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-276 631 Div. 3
(TISTP/DAW) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
PROBLEMS SOLVED ON HIGH-SPEED COMPUTING EQUIPMENT OF THE APPLIED MATHEMATICS LABORATORY. SUPPLEMENT III, 1959-1960,
comp. by L. Chatfield. Jan 62, 20p. (Rept. no. 1295-3)
Unclassified report

DESCRIPTORS: *Computers, *Naval research, *Applied mathematics. Propeller blades, Harmonic analysis, Torsion balances, Computers, Boats, Design, Transistors, Noise, Digital recording systems, Steel, Aluminum, Turbulence, Matrix algebra, Programming, Ships, Engineering.

This report contains brief descriptions of new problems programmed for solution on high-speed calculators by the Applied Mathematics Laboratory during 1959 and 1960. (Author)

4. CHEMISTRY

AD-276 524 Div. 4
(TISTM/BRW) OTS price $2.25

Leesona Moos Labs. Div., Leesona Corp., Jamaica, N. Y.
CONTINUOUS FEED FUEL CELL SYSTEMS.
Feb 62, 86p. incl. illus. table.
(Contract AF 33(600)34709, Proj. 3145)
(WADC TR 57-605, pt. 2) Unclassified report

DESCRIPTORS: *Fuel cells - Design. Electrochemistry, Electrodes, Processing, Sintering, Hydrogen, Oxygen, Nickel electrodes, Electrolytes, Potassium compounds, Hydroxides, Tests, Specifications.

The report covers an applied research program leading to the design, development and experimental test of Hydrox fuel cell systems. Designs and processes are examined, leading to the fabrication and test of multicell units. Electrode manufacturing variables are discussed and specifications are included for both the electrodes and system components. Fuel cell performance is analyzed and conclusions are based on many test runs of multicell systems. (Author)

AD-276 562 Div. 4
(TISTM/EJH) OTS price $2.60

Boston U., Mass.
MOLECULAR ORIGINS OF PRODUCTS OF REACTION OF PROPYLENE WITH ACTIVE NITROGEN.
Final rept.,
by Norman N. Lichtin and Yoshiharu Shinozaki.
3 Apr 62, 16p. incl. illus. tables.
(Contract AF 19(604)7272, Proj. 4984)
(AFCRL 62-444) Unclassified report

DESCRIPTORS: *Propenes, *Decomposition, *Nitrogen. Reaction kinetics, Deuterated compounds, Hydrocarbons, Deterioration, Atoms, Chemical reactions, Hydrogen compounds, Cyanides, Acetylenes, Ethanes, Propanes, Methyl radicals, Ethylenes, Vinyl radicals.

The molecular origins of HCN, C2H2, C2H4, C2H6, C3H8 and CH3CN formed by the reaction of active nitrogen with propylene were investigated by determining the relative molar radioactivities of these products when formed respectively from each of the three propylenes labeled specifically at a single skeletal atom with C. The results establish that none of the C2 products arise from unique sites in the propylene molecule nor are any of them the result of random incorporation of carbon. The degradative processes responsible for their formation are apparently highly complex. (Author)

AD-276 563 Div. 4
(TISTM/EJH) OTS price $1.60

California U., Berkeley.
REACTION OF OXYGEN ATOMS WITH ACETYLENE TO FORM KETENE,
by Ivan Haller and George C. Pimentel. 1962,
10p. incl. tables, 20 refs.
(Contract AF 49(638)944)
(AFOSR-2811) Unclassified report

DESCRIPTORS: *Epoxides, *Acetylenes, *Oxygen - Chemical reactions, *Oxidation. Reaction kinetics, Nitrogen compounds, Oxides, Photolysis, Infrared spectroscopy, Molecular spectroscopy, Atoms, Atomic energy levels, Deuterated compounds, Solids, Argon, Synthesis.

Nitrous oxide, N2O, was photolyzed at 20 K in solid argon containing acetylene, C2H2, or a mixture of C2D2 and C2HD. The photolysis source was a xenon resonance lamp emitting mainly at 1470 A. This radiation produces ground state oxygen atoms. Infrared spectra showed that reaction occurred with C2H2 to produce absorption at 1/2143 cm and with the deuterated acetylenes to produce absorptions at 1/2142 and 1/2117 cm. The absorptions are assigned to ketene, thus showing that ground state oxygen atoms can react with acetylene to produce ketene. The activation energy for this reaction is below 8.1 kcal/mole. (Author)

AD-276 573 Div. 4, 30
(TISTP/FR) OTS price $8.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
DYNAMIC SIMULATION OF A DISTILLATION COLUMN WITH A COMBINED ANALOG-DIGITAL COMPUTER,
by Jorge Decanini. Mar 62, 83p. incl. illus. tables, 8 refs. (Scientific rept. no. 4; Rept. no. ESL-R-102)
(Contract AF 19(604)6654, Proj. 4649)
(AFCRL 62-175) Unclassified report

DESCRIPTORS: *Fractionation, *Computers. Industrial equipment, Hydrocarbons, Mixtures, Simulation.

The applicability of a pulsed analog-digital computer to the problem of simulating a 100-plate fractional distillation column is investigated. It is concluded that such a combination would overcome the principal disadvantage of a purely analog simulation (excessive equipment requirements) and the principal disadvantage of a purely digital simulation (excessive computation time). The mathematical model for the column is presented in detail, followed by a brief description of the pulsed analog-TX-0 hybrid system. (Author)

AD-276 665 Div. 4, 25
(TISTM/EJH) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
SPECIFIC HEAT AND OTHER THERMODYNAMIC FUNCTIONS OF POLYVINYL ALCOHOL,
by R. W. Warfield and R. Brown. 27 Nov 61, 7p. illus. 14 refs. (NOLTR 61-170)
Unclassified report

DESCRIPTORS: *Polymers - Thermodynamics, *Vinyl alcohol. Specific heat, Entropy, Enthalpy, Low temperature research, Molecules, Vibration.

The lack of fundamental data on the properties of polyvinyl alcohol prompted an investigation of the available thermodynamic parameters of this material. From published data the entropy, enthalpy and Gibbs free energy were calculated over the temperature range 10 to 245 K. The thermodynamic function Cp/T was calculated and exhibits a maximum at about 80 K which is attributed to interactions between chains. The model of Stockmayer and Hecht was used to study the thermal motions of polyvinyl alcohol at low temperatures. (Author)

AD-276 669 Div. 4
(TISTM/EJH) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
METAL-POLYELECTROLYTE COMPLEXES X. THE POLY-N-VINYLIMIDAZOLE-Zn (II) COMPLEX,
by K. J. Liu and Harry P. Gregor. 1962, 12p. incl. illus. tables, refs.
(Contract Nonr-83927)
Unclassified report

DESCRIPTORS: *Polymers, *Polymer solutions, *Complex compounds, *Metalorganic compounds - Chemical bonds, *Polymerization, *Carbonic acids. Electrolytes, Azoles, Vinyl radicals, Imides, Copolymerization, Ions, Light, Scattering, Catalysts, Catalysis, Reaction kinetics, Dehydration.

METAL-POLYELECTROLYTE COMPLEXES X. THE POLY-N-VINYLIMIDAZOLE-ZN (II) COMPLEX: The binding of Zn by poly-N-vinylimidazole in 1M $NaNO_3$ at 0.01 and 0.10 M polymer concentrations showed four-fold coordination. TURBIDOMETRIC STUDY OF THE POLY-N-VINYLIMIDAZOLE-Zn (II) COMPLEX: Results indicated that the polymer chain association occurred during the complex formation, with the metal ion acting as cross-linking agent. CATALYTIC STUDIES OF THE DEHYDRATION OF H_2CO_3: The Zn(II)-poly-N-vinylimidazole complex gave no additional contribution. The catalytic effect of the poly-N-vinylimidazole was estimated in the order of 100 times that of imidazole.

AD-276 711 Div. 4
(TISTB/AW) OTS price $1.60

California U., Los Angeles.
NITROGEN OXIDES AND PHOTOCHEMICAL SMOG FORMATION. A LITERATURE SURVEY,
by K. W. Wilson. May 62, 16p. incl. tables, 16 refs. (Rept. no. 62-20)
Unclassified report

DESCRIPTORS: *Photochemical reactions, *Nitrogen compounds. Oxidation, Hydrocarbons, Oxides, Sun, Exhaust gases, Measurement, Air, Contamination, Nitrates, Atmosphere, Bibliography.

Up to the present time no experiments simulating smog formation have been performed in which all of the nitrogen oxides present initially could be accounted for in terms of final products which were identified and measured. This may indicate that unknown compounds are formed, or perhaps may merely indicate a lack of precision in measurements. On the basis of presently available evidence it appears that nitric acid, alkyl nitrates, and acyl and peracyl nitrates are the most probable reaction products. (Author)

AD-276 748 Div. 4
(TISTM/BRW) OTS price $2.25

Research Chemicals Div., Nuclear Corp. of America, Burbank, Calif.
THE PREPARATION OF HIGH PURITY RARE EARTH METALS. Scientific rept. no. 2, 1 Jan 61-31 Jan 62,
by C. J. Heinink. Apr 62, 1v. incl. illus. tables, 22 refs. (Rept. no. RC 196)
(Contract AF 19(604)7491, Proj. 4608)
(AFCRL 62-315) Unclassified report

DESCRIPTORS: *Rare earths, *Gadolinium, *Europium, *Lutetium, *Praseodymium. Preparation, Purification, Separation, Fractionation, Oxidation-reduction reactions, Ion exchange, Chromatographic analysis, Spectrographic analysis, Exchange reactions, Ion exchange resins, Metals.

Ultra high purity rare earth metals, praseodymium, europium, gadolinium and lutetium with total metallic impurities of less than 10 ppm have been made. Methods of separation, reduction and purification were: ion exchange, mercury amalgamate oxidation-reduction, dry fluoride preparation, metallothermic reduction and vacuum distillation. Spectrographic methods were improved and refined to obtain greater sensitivity. Gas chromatography was investigated as an analytical tool for determination of impurities in rare earth organo metallics. (Author)

AD-276 870 Div. 4
(TISTM/TCG) OTS price $1.60

Politecnico di Milano (Italy).
RESEARCHES ON THE INFLUENCE OF SOME MINOR CONSTITUENTS OF THE SOLUTION ON HYDROGEN OVERVOLTAGE OF Cu SINGLE CRYSTALS.
Interim rept. for 1 Jan-1 Mar 61, on Characterization of Solid Phase and Interface Phenomena in Crystalline Substances,
by B. Rivolta and A. Pappagallo. Mar 62, 18p. incl. illus. tables, 13 refs.
(Contract AF 61(052)144, Proj. 7353)
(ASD TDR 62-229) Unclassified report

DESCRIPTORS: *Copper, *Single crystals, *Cathodes (Electrolytic cell). Crystals, Electrodes, Hydrogen, Voltage, Electrolytes, Sulfuric acid, Chemical impurities, Cadmium, Arsenic, Antimony, Indium, Electrochemistry.

The influence of 10 to the -5th power M/l of Cd and 10 to the -4th power M/l of As, Sb, and In in 0.1M H_2SO_4 on the H overvoltage of Cu polycrystalline and single crystal cathodes, oriented following the (111), (110), and (100) planes, was investigated. In the cd range studied, due to the presence of Cd and In, the Tafel line was broken into two branches, shifted one from the other, having almost the same b value. In the presence of Sb, or As, the overvoltage vs log cd plot remained linear, but the slope value for As is lower. (Author)

AD-276 924 Div. 4, 14
(TISTM/TCG) OTS price $3.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
STUDIES ON INORGANIC POLYMERS CONTAINING PHOSPHORUS, S-N-BONDS AND CATENATED RINGS,
by I. C. Popoff. May 62, 28p. incl. illus. tables, 21 refs. (Technical rept. no. 31)
(Contract Nonr-268700)
Unclassified report

DESCRIPTORS: *Inorganic substances, *Polymers - Synthesis, *Phosphorus compounds, *Sulfur compounds, *Triazines. Chemical bonds, Chemical reactions, Polymerization, Catalysts, Nitrogen compounds, Amines, Sulfonamides, Amides, Phenyl radicals, Phosphonic acids, Chlorides, Pyridines, Carbonyl radicals, Molecular structure, Temperature, Stability.

Attempts to prepare high temperature stable inorganic polymers containing catenated triazine rings resulted in refractory products from which 2-amino-, 2-hydroxy-, and 2-phenyl-4,6-diureido-1,3,5-triazine were isolated. N,N'-Diarylsulfamides rearranged to arylsulfonamides. $PhNHSO_2HNPh$ and (p)$CH_3C_6H_4NHSO_2HNC_6H_4CH_3$(p) seem to form linear oligomers with polymerization degree n=2-4 when heated at 150 to 200 C. The reactions of $PhP(O)Cl_2$ with $PhNHSO_2HNPh$ and with $MeNHSO_2HNMe$ were studied. $Ph_2P(O)NCO$ and $PhP(O)(NCO)_2$ were synthesized and identified. Crude copolymers of $PhP(O)(NCO)_2$ with p-$(NH_2)_2C_6H_4$ and with m-$(NH_2)_2C_6H_4$ were prepared. $P(O)(NCO)_3$ and $P(O)(NCS)_3$ were reacted with 2,6-diaminopyridine, p-$(HO)_2C_6H_4$, p-$(NH_2)_2C_6H_4$, $H_2NC(O)NH_2$, benzoguanamine and melamine. The structures of $(Et_2N)_2P(O)N_3$, $(Et_2N)_2P(S)N_3$, and $(EtO)_2P(O)N_3$ were established to be linear rather than cyclic. The aminolysis of $(Et_2N)_2P(O)N_3$ and of $(EtO)_2P(O)N_3$ to $Et_2NP(O)(NHPh)_2$ and $(HO)_2P(O)HNPh$, respectively, was studied. (Author)

AD-276 991 Div. 4, 14
(TISTM/EJH) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
THE VISCOELASTIC PROPERTIES OF CROSSLINKED POLY(ETHYLENE TETRASULFIDE) POLYMERS. II,
by A. V. Tobolsky, R. B. Beevers and G. D. T. Owen. June 62, 26p. incl. illus. tables (ONR Technical rept. no. RLT-48)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Polymers - Viscosity, *Elastomers, *Synthetic rubber, *Vulcanizates, *Chemical bonds. Polymerization, Copolymerization, Elasticity, Relaxation time, Molecular structure, Energy, Reaction kinetics, Ethylenes, Sulfides, Chlorides, Propanes.

Stress relaxation studies were made on poly(ethylene tetrasulfide) crosslinked during the polymerization reaction by the use of trifunctional organic chloride. At very low crosslink densities a certain amount of stress-relaxation due to chain slippage occurred. Over the middle range of crosslinking density stress-relaxation was due to tetrasulfide bond interchange exclusively, and these samples followed Maxwellian decay of stress. The specific rate constant for bond interchange (k) is given by $k = 5.86 \times 10$ to the 12th power (exp $-.25900/RT$). The value of the activation energy obtained is discussed in the light of the various energy values reported for the scission of sulfur-sulfur bonds in sulfur chains and rings. (Author)

5. COMMUNICATIONS

AD-276 564 Div. 5, 6, 12
(TISTW/EET) OTS price $8.10

Philco Corp., Blue Bell, Pa.
STUDY AND INVESTIGATION OF ACQUISITION AND TRACKING OF OPTICAL COMMUNICATION SYSTEMS.
Interim engineering rept. no. 4, 1 Mar-31 May 62, by R. F. Anderson. 31 May 62, 80p. incl. illus. tables (Rept. no. 9036-4)
(Contract AF 33(616)8392)
Unclassified report

DESCRIPTORS: *Light communication systems, *Optical tracking, *Satellite vehicles, *Lunar probes, *Spaceships. Tracking, Orbital flight paths, Gyroscopes, Satellite attitude, Equations, Mathematical analysis, Signal-to-noise ratio, Analog computer, Stellar eclipses, Moon, Stars, Sun, Solar systems, Lasers, Stabilization, Communications theory.

Results are presented concerning the study and investigation of acquisition and tracking for two hypothetical, optical, space communications links. The specific items cover work done on servo tracking loop design, the merits of communication between earth orbiting equatorial satellites, acquisition of false targets, and acquisition and tracking sensitivity. (Author)

AD-276 618 Div. 5
(TISTE/CAM) OTS price $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
ANALYSIS OF MEANS OF AIR-LAYING WIRES AND CABLES WITH SUFFICIENT SLACK,
by Leon T. Wilson. 7 Mar 62, 12p. incl. illus. (ASRDL Technical rept. no. 2264)
Unclassified report

DESCRIPTORS: *Air drop operations, *Field wire communication systems, *Telephone cables, *Military communications. Wire, Wind, Velocity, Tensile properties, Stresses, Terrain, Differential equations, Analysis.

In air-laying wires and cables, it is necessary to lay sufficient slack to avoid breaks, particularly over rough terrain. To overcome this problem, an analysis was made which shows that the needed slack can be obtained by a suitable adjustment between the height of the aircraft and its ground-speed or vice versa. (Author)

AD-276 654 Div. 5
(TISTE/CAM) OTS price $1.60

General Dynamics/Electronics, Rochester, N. Y.
FORMANT VOCODER SPEECH COMPRESSION SYSTEM (EXPERIMENTAL MODEL).
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62, by L. C. Stewart. 31 Mar 62, 13p. incl. illus.
(Contract DA 36-039-sc-87252, Proj. 3B31-07-001)
Unclassified report

DESCRIPTORS: *Speech, *Speech transmission - Coding, *Voice communication systems. Data processing systems, Digital systems, Circuits, Multiplex transmission, Band-pass filters, Functions, Noise generators, Low pass filters.

Effort continued to construct an experimental model formant vocoder speech compression system, a 1500 bit-per-second system having a minimum articulation index of 80% for a phonetically balanced word list. Progress was devoted to testing and checking the equipment. The major portion of the equipment construction is completed; all of the digital boards are constructed and most of the inter-board wiring is completed. (Author)

AD-276 847 Div. 5
(TISTE/CDM) OTS price $19.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATION OF DIGITAL DATA COMMUNICATION SYSTEMS (PHASE 2 REPORT).
Rept. for Jan 61-Jan 62,
by Harold D. Becker and John G. Lawton. 20 Feb 62, 311p. incl. illus. refs. (Rept. no. UA-1420-S-2)
(Contract AF 30(602)2210, Proj. 4519)
(RADC TDR 62-134) Unclassified report

DESCRIPTORS: *Data transmission systems, *Digital systems, *Communication systems, *Pulse communication systems. Mathematical analysis, Errors, Attenuation, Phase shifters, Multiplex transmission, Sidebands, Frequency modulation, Diversity reception, Noise (Radio), Analysis, Frequency shift keyers, Communications theory.

Results are presented of investigations on a variety of topics related to the transmission of digital data. Included is an analysis of the degradation of the performance of noncoherent binary FSK and carrier keyed systems due to a frequency offset of the received signal. The optimization of systems operating over dispersive channels in the presence of nonwhite, gaussian noise is treated and the effects of medium phase perturbations on the performance of digital systems are analyzed. Partial orderings of digital channels specified by their transition probabilities are also investigated. (Author)

6. DETECTION

AD-276 507 Div. 6
(TISTW/DLW) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
RADIO DIRECTION FINDING OVER A TROPOSCATTER PATH. PART I. GENERAL DESCRIPTION,
by R. S. Hebbert and E. H. Hug. 1 Aug 61, 5p. illus. (Rept. no. NOLTR 61-76)
Unclassified report

DESCRIPTORS: *Direction finding, *Radio interferometers, *Bearing finding, *Microwaves - Propagation. Feasibility studies, Ultra high frequency, Scattering, Wave transmission, Atmosphere, Reliability, Tests.

Measurements of fluctuations (from the great circle path to a transmitter) in the bearing estimates of a microwave interferometer were made at 910 mc with the transmitter located beyond the horizon. A general description is presented of the apparatus and some experimental results. The standard deviations of the bearing estimates were typically of the order of 1/10 degree for averaging times longer than 10 seconds, larger fluctuations being observed on over-land than over-water paths due to asymmetries in the cross-path geometry coupled with humidity differences. (Author)

AD-276 531 Div. 6
(TISTW/DLW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
CUMULATIVE PROBABILITY OF DETECTION FOR TARGETS APPROACHING A UNIFORMLY SCANNING SEARCH RADAR,
by J. D. Mallett and L. E. Brennan. Apr 62, 19p. incl. illus. 3 refs. (Memo. no. RM-3095-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Search radar - Effectiveness, *Radar targets - Detection, *Detection - Mathematical prediction, *Radar ranges, *Radar scanning. Aerial targets, Probability, Statistical analysis, Statistical functions, Radar charts, Radar analysis.

The cumulative detection probability of a search radar is discussed when it is scanning uniformly. This is the probability that a target approaching the radar at a constant radial velocity is detected at least once by the time it reaches a given range, as distinguished from the more common blip-scan ratio (a single-scan detection probability). It is shown that for constant-velocity targets the range for a given cumulative detection probability varies as the cube root of the power-aperture product, rather than as the fourth root. Curves of cumulative detection probability as a function of normalized range are given for three different target scintillation models. Also, curves of optimum (normalized) frame time are given as a function of the desired cumulative detection probability for each of the three target scintillation characteristics. (Author)

AD-276 569 Div. 6, 22
(TISTW/RD) OTS price $3.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
TRACKING TESTS WITH SPERRY HELICOPTER FIRE CONTROL SYSTEM MOUNTED IN AN H21 HELICOPTER,
by C. C. Haines. Apr 62, 32p. incl. illus. tables (Test rept. no. T62-11-1)
Unclassified report

DESCRIPTORS: *Optical tracking, *Aircraft fire control systems, *Optical sights. Helicopters, Fire control, Fire control systems, Tracking, Recoilless rifles, Optical systems, Flight testing.

The testing of a stabilized sighting system mounted in an H21 helicopter is described. This sight is unique in that stabilization signals are generated by the navigational equipment already available in the airship. Tracking error under a wide variety of flight and target conditions averaged approximately 2 mils rms. It was concluded that while the hardware tested had certain deficiencies, particularly regarding vibration, the principle of obtaining signals from the aircraft navigational equipment for sight stabilization had promise. This is particularly true for systems where angular tracking accuracy of approximately 3 mils is acceptable. (Author)

AD-276 639 Div. 6, 12
(TISTE/CDM) OTS price $12.50

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
USERS TELEMETRY TRANSDUCER WORKSHOP. MINUTES OF THE SECOND MEETING, 25-26 JULY 1961, HOLLOMAN AFB, NEW MEXICO,
by W. M. Sanders and W. L. Gaiser. 1961, 177p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Transducers - Symposia, *Pressure gages - Test methods, *Telemeter systems - Conferences, *Guided missile tracking systems - Instrumentation. Standardization, Collecting methods, Handbooks, Dictionaries, Calibration, Design, Radiation hazards, Bibliography.

Contents:
Description and aims of the Transducer Committee of the Telemetry Working Group (IRIG)
Telemetry transducer handbook
TWG transducer glossary status
Collection and dissemination of evaluation data on telemetry transducers
Recommended methods of standardization and testing
Dynamic testing of pressure gages
Acceleration calibration procedures at WSMR
NBS telemetering transducer program
BuWeps transducer development program
Telemetry transducers for radiation environments
JANAF
Discussion on the transducer handbook
General discussion on the glossary
Report on telemetry transducer R & D activities
Nomenclature and specification terminology for aero-space test transducers with electrical output

AD-276 647 Div. 6
(TISTW/RD) OTS price $7.60

General Dynamics/Astronautics, San Diego, Calif.
ROCKET-BORNE IR SCANNING RADIOMETER FOR HIGH ALTITUDE RADIATION MEASUREMENTS,
by Vern N. Smiley. 10 Apr 62, 65p. incl. illus. tables, 13 refs. (Scientific rept. no. 1, Rept. no. AE62-0216)
(Contract AF 19(604)7417, Proj. 4427)
(AFCRL 62-431) Unclassified report

DESCRIPTORS: *Infrared scanning, *Radiometers. High altitude, Infrared radiation, Infrared detectors, Transistors, Lead compounds, Selenium, Atmosphere, Infrared filters, Infrared telescopes, Infrared optical systems, Rockets, Airborne.

A transistorized, scanning, filter radiometer designed for use in an Atlas piggy-back pod is described. The instrument is designed for moderately narrow-band measurements at 2.7, 3.5, 4.3, 4.7, and 6.3 microns of the irradiance arriving at the radiometer from the earth's atmosphere within a small field of view as a function of height above the true horizon. The measurements will be made while the vehicle is in the altitude range 3 x 100,000 to 10 to the 6th power feet. A fairly complete description of the optics, electronics, and mechanical parts is given, including a description of calibration techniques. (Author)

AD-276 696 Div. 6, 18
(TISTA/VGW) OTS price $8.60

Pennsylvania Research Associates, Inc., Philadelphia.
INVESTIGATION OF DIGITAL TECHNIQUES FOR RADAR LAND MASS SIMULATION.
19 Feb 62, 89p. incl. illus. 19 refs.
(Contract N61339-1025)
(NAVTRADEVCEN 1025-1) Unclassified report

DESCRIPTORS: *Radar equipment - Display systems, *Radar scanning - Airborne. Surface targets, Analog computer, Analog-to-digital converters, Digital systems, Effectiveness, Simulation.

The extent to which digital computing techniques may afford improved performance in the real-time simulation of airborne radars is investigated. It is desired to reproduce the display formed by a scanning ground-mapping radar having a range of 200 miles and a resolution of 100 feet. The simulated radar is mounted in an aircraft that flies at a maximum speed of mach 3 at any altitude up to 60,000 feet. To simulate such a radar in real time without advance knowledge of the flight path or maneuvers of the aircraft, a conventionally organized computer would need bit rates in the order of nanoseconds to perform the required calculations. Reductions in this requirement can be effected by a reorganization of the logic for this special-purpose application, such as predicting where along the terrain the radar will be looking at a future time and instituting the appropriate calculations on a large region rather than on each discretely resolvable point of the terrain. Then if advantage is taken of known characteristics of the terrain and the radar, analog devices may be assigned under control of the digital computer for the high-frequency pattern- and function-generation. Thus the economically feasible method, using present components and devices, is to use a hybrid computer which performs the storage and decision-making functions and sets parameters into analog devices for construction of the intensity-modulated display waveform. (Author)

AD-276 862 Div. 6
(TISTP/TL) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
EXTENDED APPLICATION OF A COBALT GLASS DOSIMETER,
by William T. K. Johnson. 5 June 62, 25p. incl. illus. tables, 12 refs. (Rept. no. DOFL TR-1050)
(Proj. 23720)
Unclassified report

DESCRIPTORS: *Cobalt, *Glass, *Dosimeters, *Thermal neutrons - Measurement. Gamma rays, Fast neutrons, Spectrophotometers, Light transmission, Ionization chambers, Radiation counters.

Cobalt glass dosimeters, normally used to measure gamma ray and electron fields, were used to measure gamma ray and coexistent thermal neutron fields in the presence of a fast neutron field. The dosimeter is darkened in proportion to the energy deposited and this darkening is calibrated in known gamma ray and thermal neutron fields. A three-glass sandwich was used to distinguish the effects of gamma rays and thermal neutrons. The sensitivity of the glass to various energy gamma and x-rays is presented. A simple spectrophotometer is used to measure the transmission of light through the glass dosimeter. (Author)

7. ELECTRICAL EQUIPMENT

AD-276 649 Div. 7
(TISTM/BRW) OTS price $2.25

Delco-Remy Div., General Motors Corp., Anderson, Ind.
TEST REPORT ON SEALED SILVER OXIDE-ZINC SECONDARY CELLS.
Rept. for 25 Apr-4 Nov 61, on Silver Oxide-Zinc Battery Program,
by J. A. Keralla. Feb 62, 78p. incl. illus. tables.
(Contract AF 33(600)41600, Proj. 3145)
(ASD TR 61-636) Unclassified report

DESCRIPTORS: *Storage batteries, *Electrolytic cells. Silver compounds, Oxides, Zinc, Electrodes, Electrolytes, Potassium compounds, Hydroxides, Battery separators, Battery compartments, Nylon, Plastic seals, Tests, Data, Electric current, Voltage, Pressure, Vibration, Acceleration, Shock resistance.

Sixty-five cells, constructed with hand-fabricated lucite containers and equipped with pressure gauges, were employed to determine cycle life using various combinations of separators and negative plate additives. Cycle life with one separator combination was also determined at three different depths of discharge in three different temperature ranges. The maximum cycle life obtained from the above group was 1760 cycles at 21% depth of discharge at room temperature. Three cells with molded nylon containers and covers, with a metal terminal-to-plastic seal successfully passed the required environmental tests. This and five cells with the same construction have completed over 600 cycles. Eight additional cells with the same construction except for a negative plate variation have completed over 400 cycles. Eight cells, employing the best design parameters from the previous eighty-one cells, were activated in lucite jars and placed on cycle life test. A projected battery energy-to-weight ratio utilizing these eight cells is about 8 whr/lb for the 2-hr cycle. (Author)

AD-276 801 Div. 7
(TISTE/CDM) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
ILLUMINANTS EQUIPPED WITH POWERFUL XENON LAMPS (Svetil'niki s Moshchnymi Ksenonovymi Lampami),
by V. V. Trembach. 1961, 9p. incl. illus. tables, 8 refs. (Trans. no. T-1497 from Svetotekhnika 8:1-7, 1961)
Unclassified report

DESCRIPTORS: *Xenon lamps, *Lighting equipment, *Reflectors. Design, Specifications, USSR.

Experimental and theoretical investigations of mirror illuminants for high-powered xenon lamps were made. It was found that the material for the reflector must have a reflective coefficient of not less than 0.65. The material of the mirror reflector and the flat inserts must also be corrosion resistant and must be able to withstand high temperatures (up to 300 C). In the design of illuminants, the problem of cleaning, and restoring the mirror properties of the reflector during operation must be taken into account. It is recommended that screens be made of ordinary steel (without luminescent covering) and that reinforcements be provided against buckling. The illuminant must be equipped with a spare lamp that switches on automatically when the original lamp burns out. The light aperture under the lamp must be covered by a protective screen that furnished protection against splinters should the lamp break. The design of a single beam illuminant must provide for its rotation both around the vertical axis (support tower) and relative to the axis of the lamp. To reduce the danger of the reflector's buckling, it must be made of individual sheets whose one dimension must be equal to the length of the profile curve, and the other - not more than 500 mm. (Author)

AD-276 804 Div. 7
(TISTE/CDM) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PRESENT STATE OF DEVELOPMENT OF AUTOMATED ELECTRIC POWER SUPPLY,
by V. S. Aleksandrov, B. B. Voronetskiy and others. 1961, 9p. incl. illus. (Trans. no. T-1509)
Unclassified report

DESCRIPTORS: *Power supplies - Industrial equipment, *Electric power production, *Electrical equipment, *USSR - Automatic. Electric machinery, Electric motors, Transducers, Blast furnaces, Rolling mills, Mining engineering, Power plants, Paper industry, Marine engines, Electric cables, Automatic, Magnetic amplifiers.

The present state of development of automated electric power supply in the USSR is discussed. The electric power supply is treated in relation to the following areas: electric machines; transducer technology; low voltage apparatus; assembled devices for control, safety, and regulation; metallurgical industry; mining industry; metal working machines; energy generating installations; paper industry; cable industry; and electric drives for ships. Developments in the area of creation of complex systems of electric power supply for various branches of industry are included.

AD-276 859 Div. 7
(TISTW/RD) OTS price $7.60

Goodrich-High Voltage Astronautics, Inc., Burlington, Mass.
ANALYSIS OF THE AVAILABLE INFORMATION ON ELECTRIFICATION PRODUCED BY THE DYNAMIC INTERACTION OF LIQUIDS WITH SOLIDS.
Final rept.,
by A. Lucile Cox. 6 Feb 62, 56p. 173 refs.
(Contract DA 19-020-ORD-5452, Proj. TN 2-8106)
Unclassified report

DESCRIPTORS: *Electric power production, *Power supplies, *Electrostatic fuzes. Generators, Electrostatic generators, Voltage regulators, Current regulators, Guided missile warheads, Detonation, Electrostatics, Guided missile fuzes.

An examination is made of the literature on static electrification and generation of electrical power at high voltage. Applicable information is presented on high voltage generators, static electrification problems in various industries, and contact potentials. (Author)

AD-276 881 Div. 7
(TISTP/TL) OTS price $8.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON OPTIMAL LINEAR CONTROL SYSTEMS WHICH MINIMIZE

THE TIME INTEGRAL OF THE ABSOLUTE VALUE OF THE CONTROL FUNCTION (MINIMUM-FUEL CONTROL SYSTEMS), by Michael Athanassiades. 10 May 62, 90p. incl. illus. tables, 7 refs. (Rept. no. 22G-4)
(Contract AF 19(604)7400)
(AFESD TDR 62-93)
Unclassified report

DESCRIPTORS: *Control systems - Design, *Linear systems, *Time, *Functions, *Matrix algebra, *Differential equations. Integral equations, Analysis, Feedback, Energy, Fuels, Vector analysis, Signals, Transformations (Mathematics), Fluid flow, Velocity.

The so-called ''minimum-fuel'' optimum control system is examined. One concern is with systems for which the control signal is proportional to fuel, such as fuel exhaust in a missile or gas exhaust from a gas jet in an attitude control system. The total fuel consumed during a control action is proportional to the time integral of the absolute value of each control signal. Given a linear system which is to execute a given task, then one is interested in determining the control signal which requires the least amount of fuel to accomplish the given task. It is assumed that each control signal is bounded in magnitude by unity. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-276 502 Div. 8
(TISTE/CDM) OTS price $2.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
TWO EXPERIMENTAL SEMICONDUCTOR-MAGNETIC PULSE MODULATORS,
by R. Jordan, C. Price, and L. Swain. May 62, 20p. incl. illus. (Rept. no. ESL-TM-139)
(Contract AF 33(657)7644)
Unclassified report

DESCRIPTORS: *Pulse generators, *Radar pulses, *Magnetic modulators. Semiconductors, Saturable transformers, Radiofrequency power, Tests, Switching circuits, Capacitors, Magnetic cores, Pulse modulation, Electronic circuits, Radar equipment.

Two experimental high-power pulse modulators, incorporating a combination of semiconductor and magnetic switching, are described. The circuits, with average output powers of 2000 and 160 watts, were designed according to a new technique and are remarkably lightweight (the 160-watt unit weighs approximately 5 lbs., the 2000-watt unit only 15 lbs.) and efficient. By virtue of their solid-state construction, the modulators show promise of being extremely reliable and potentially long-lived. The basic circuit common to both units is adaptable to a wide range of output powers, types of load, and power-supply requirements. The 2000-watt modulator is designed for continuous operation from a conventional unregulated power supply; peak power output is 1 megawatt in a 2-microsecond pulse. In contrast, the 160-watt modulator is intended for an application where power is supplied by a battery pack; output pulse width is 1 microsecond, with .16 megawatts peak power. The circuit design principles incorporated into the two modulators are discussed, and detailed performance data for both circuits are presented. (Author)

AD-276 503 Div. 8
(TISTP/FR) OTS price $9.10

Microwave Lab., Stanford U., Calif.
EFFECTS OF ELECTRON BEAM CONFINEMENT ON KLYSTRON EFFICIENCY,
by Charles G. Nelson. Apr 62, 97p. incl. illus. tables, 12 refs. (ML rept. no. 910)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

DESCRIPTORS: *Klystrons, *Electron beams. Effectiveness.

The effects of magnetic field configuration on klystron efficiency were measured, especially the effects of introducing magnetic flux at the cathode, leading to so-called confined flow in the electron beam. The experiments were performed using a two-cavity klystron of special design, incorporating a movable output cavity and a scanning iris. The scanning iris permitted measurements of dc and rf current distribution in the beam; longitudinal movement of the cavity made these measurements possible at various axial positions and allowed the determination of optimum cavity spacing. Detailed studies were made on four beams requiring magnetic focusing fields of up to twice the Brillouin field. Detailed current distributions in these beams were used in determining various parameters useful in analyzing klystron performance, such as plasma wavelength, beam coupling coefficients, and beam loading conductance. (Author)

AD-276 522 Div. 8, 30
(TISTE/CAM) OTS price $5.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
APPLICATION OF THE SLOT ANTENNA TO POWER DENSITY MEASUREMENT.
Appendix 5.4-1 to Final rept. of Power Density Measurement Techniques,
by Kamal Ya'Coub. 31 Dec 61, 50p. incl. illus. tables, 10 refs.
(Contract DA 36-039-sc-85177)
Unclassified report

DESCRIPTORS: *Slot antennas, *Radiofrequency power - Density. Measurement, Resonance, Impedance, Antennas, Wire screens, Electromagnetic fields, Electric fields, Capacitors, Functions, Geometry, Design, Power meters.

The narrow-band properties of the normally-resonant slot antenna are altered significantly as the load resistance is reduced. For example, an antenna with a length-to-width ratio of 30, has its 1 db max-min wavelength ratio changed from 3 to 11 as the resistance is reduced from 50 to 10 ohms. This bandwidth increase is accompanied by a reduction in aperture and hence sensitivity. Because of this, as well as other practical considerations, it does not appear that the required 100:1 wavelength ratio can be obtained by this means alone. Changing the dimensions of the slot also affects the bandwidth as might be expected from the analogous behavior of fat vs thin dipoles. For a fixed loading of 10 ohms, the length-to-wavelength ratio for a 1 db decrease in sensitivity changes from 0.063 to 0.02 for a corresponding change in length-to-width ratio from 15 to 2. Increasing reactance at the low end of the band and a sharp increase in effective length near the high end of the band can separately be compensated, at least theoretically, by the introduction of capacitance both in series with and in shunt with the load. With this additional compensation a loaded slot antenna can be made which theoretically will cover the required 100:1 frequency band. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-276 527 Div. 8
(TISTP/FR) OTS price $3.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
EVALUATION OF A BURST-ERROR CORRECTION CODE ON A GILBERT CHANNEL,
by Donald G. Iram. May 62, 57p. incl. illus. 8 refs. (RADC-TDR-62-189)
(Proj. 4519)
Unclassified report

DESCRIPTORS: *Errors, *Coding. Communications theory.

Error correction codes have been designed to allow the communication engineer to add a degree of error protection to transmitted digital data. Difficulties arise, however, when it is desired to obtain maximum efficiency from the redundant digits added to a particular channel. A technique for evaluating the improvement afforded a fading-type channel by the use of a burst-error correcting code is illustrated. The Gilbert model of a fading channel is then evaluated using this technique. A series of curves are presented showing the improvement in error rate afforded this particular channel by a burst-error correction code as a function of the reduced information rate. (Author)

AD-276 530 Div. 8, 15
(TISTP/WH) OTS price $9.60

RAND Corp., Santa Monica, Calif.
THE SEQUENTIAL ESTIMATION AND DETECTION OF SIGNALS IN NORMAL NOISE,
by Ivan Selin. June 62, 113p. incl. illus. 42 refs. (Memo. no. RM-2994-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Information theory, *Sequential analysis. Signal-to-noise ratio, Statistical analysis, Functions.

The sequential detection of signals in stationary, normal, colored noise is discussed. Two classes of signals are considered: signals which are known exactly, and signals known except for a finite number of parameters. (Author)

AD-276 551 Div. 8
(TISTW/DLW) OTS price $3.60

Tennessee U. Engineering Experiment Station, Knoxville.
CIRCULAR ARRAYS FOR ELECTRONIC SCANNING.
Final rept., 15 Nov 58-15 Dec 61,
by H. P. Neff, D. R. Stephens and others.
15 Jan 62, 32p. incl. illus. 4 refs.
(Contract AF 19(604)4967, Proj. 4600)
(AFCRL 62-337) Unclassified report

DESCRIPTORS: *Electronic scanners - Antennas, *Dipole antennas, *Loop antennas, *Antenna radiation patterns. Electromagnetic theory, Focusing, Electronic circuits, Antenna hardware, Design.

Two antennas are described which give directional patterns which can be pointed to any azimuth angle by electronic means. One, consisting of concentric rings of dipoles gives a theta-polarized field and the other, consisting of concentric loops gives phi polarization. Only a brief description of each is given. In each case an abstract is included of the scientific report containing a complete description. Both antennas use the same electronic circuitry, and a description of this is given. (Author)

AD-276 554 Div. 8, 25, 17
(TISTM/EJH) OTS price $4.60

Thermo Electron Engineering Corp., Waltham, Mass.
THERMIONIC EMITTER MATERIALS RESEARCH PROGRAM.
Quarterly rept. no. 2, 1 Oct-31 Dec 61,
by S. Kitrilakis and J. Weinstein. 31 Dec 61, 1v. incl. illus. (Rept. no. TEE-4015-2)
(Contract Nonr-356300)
Unclassified report

DESCRIPTORS: *Thermionic emission - Test methods, *Diodes - Design, *Molybdenum, *Tantalum. Electron tubes, Cesium electron tubes, Surfaces, Metal coatings, High temperature research.

The experimental work necessary to complete the studies of the characteristics of Ta and Mo as emitters in thermionic converters was completed. The parametric experiments during this period were performed with greater accuracy and rapidity due to the method of observing and recording data. The data on Ta and Mo emitters was carefully reduced and analyzed. Parametric curves which can be used by diode designers are presented. The results of experiment and analysis of surface characteristics which are currently being used to guide the development of a comprehensive theory of the cesium converter are included. (Author)

AD-276 598 Div. 8
(TISTE/CAM) OTS price $2.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOGENERATOR POWER CONVERSION STUDY.
Interim rept. no. 2, Mar-May 62,
by I. Limansky, E. F. Wood and A. S. Jensen.
May 62, 23p. incl. illus.
(Contract AF 33(657)7865)
Unclassified report

DESCRIPTORS: *Phototubes - Production, *Solar cells, *Power transformers, *Generators. Design, Manufacturing methods, Processing, Cathodes (Electron tubes), Anodes (Electron tubes), Vacuum seals, Evaporation, Vacuum apparatus, Glass, Surfaces, Indium, Cesium, Test methods.

Effort was continued on investigating ways and means of constructing developmental models of a close-spaced, thin, solar power converter using the photoemissive principle. This presentation discusses the progress made in the fabrication of component parts for the thick-glass, close-spaced photogenerators WX-4966 and WX-4967, describes the successful deposition of an S-11 photosurface in the WX-4220 coating control tube, and describes a vacuum processing fixture presently being made for in-vacuum sealing and processing of the photoemissive solar power converter. (Author)

AD-276 637 Div. 8, 25
(TISTE/CDM) OTS price $8.60

Acoustics Research Lab., Harvard U., Cambridge, Mass.
HIGH-FREQUENCY ELECTROSTATIC TRANSDUCERS FOR USE IN GASES,
by Wayne M. Wright. Apr 62, 92p. incl. illus. tables, 26 refs. (Technical memo. no. 47)
(Contract Nonr-186624)
Unclassified report

DESCRIPTORS: *Electroacoustic transducers, *Microphones, *Electrostatics, *Transducers, *Sound transmission. Theory, Medium frequency, Design, Gases, Ultrasonics, Test methods, Thin films, Aluminum coatings, Air, Electrodes, Diaphragms (Mechanics), Plastics, Mathematical analysis.

Electrostatic transducers have been developed which serve as sources and receivers of sound in gases and which are useful, at atmospheric pressure, as frequencies as high as one mc/sec. When operated as microphones, these instruments have sensitivities of the order of -90 db re 1 v/dyne-sq cm up to .5 mc and corresponding rise times of less than one microsecond for transient signals. A comprehensive treatment is presented of the theory and design of these high-frequency electrostatic transducers, and the results of an investigation of their behavior in air under normal laboratory conditions are included. The theoretical analysis assumes that the trapped air film has a uniform thickness (of the order of one micron), and that the compliance of this air film and the mass per unit area of the diaphragm determine the resonance frequency of the transducer. Response characteristics at ultrasonic frequencies are found by measuring the voltage gain of transmitter-air-microphone systems with acoustic path lengths of about six in., and the transient behavior is verified with acoustic impulses from small sparks. (Author)

AD-276 638 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Knights, James, Co., Sandwich, Ill.
INTEGRATION COMMITTEE REPORT, MINIATURE GLASS ENCLOSED CRYSTAL UNITS, TYPE CR-(XM-29)/U.
Progress rept.
1962, 12p. incl. illus.
(Contract DA 36-039-sc-81298)
Unclassified report

Presented before the Integration Committee Meeting, Atlantic City, N. J.

DESCRIPTORS: *Crystal oscillators, *Crystal holders, *Seals, *Heating elements. Glass seals, Quartz crystals, Vacuum seals, Miniature electronic equipment, Manufacturing methods, Processing, Preparation.

Effort was continued to devise production methods and tools for the production of 500 type-CR-(XM-29)/U crystal units per eight hour shift. Units were housed in miniature glass enclosure, type HC-26/U. Three types of crystal mounts were investigated. The most favored was the modified version of the tab clip. This version may be used without a dimple hole through which cement can be applied. Several epoxy cements were tested. Cements considered favorable were, bakelite-silver, sodium silicate, silpaint, and pyroceram. Pyroceram was the most favorable. A sealing machine was fabricated for use with the HC-26 glass enclosure. Frequency shift was noted during sealup. When epoxy cements were used shifts from 1-5 ppm plus/minus the original frequency were indicated. With pyroceram cement shifts from 10-20 ppm positive were indicated. Two methods were tested for sealing with the sealing machine without use of gas flame. These methods were abandoned as control of gas flame developed.

AD-276 643 Div. 8
(TISTE/CDM) OTS price $5.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
AN INVESTIGATION OF THE INTERACTION BETWEEN A PERIODIC ELECTRON BEAM AND AN UNLOADED WAVEGUIDE MODE,
by W. Lee Dickson, Curtis C. Johnson, and Richard W. Grow. 4 May 62, 48p. incl. illus. tables, 7 refs. (Technical rept. no. ONR-4)
(Contract Nonr-128805, Proj. NR 373-740)
Unclassified report

DESCRIPTORS: *Electron beams, *Waveguides, *Waveguide couplers, *Microwave equipment. Magnetic fields, Helixes, Radiofrequency power, Deceleration, Extremely high frequency, Theory, Rhythm, Mathematical analysis.

An investigation was made of the interaction between a periodic electron beam and an unloaded waveguide mode. It is known that energy can be transferred to waveguide fields from an electron beam which possesses considerable transverse velocity components. One embodiment of this principle consists of a spiraling beam in a TE10 rectangular waveguide. For net energy exchange, the fields must produce electron bunching. A small signal axial bunching theory is carried out and a description of the bunching is presented. It is found that radial deflections and energy exchange accompany this bunching process. Based on the bunching theory developed, a large signal interaction theory was carried out on the digital computer. Results show that good efficiencies can be obtained at modest gains, and the beam must be injected such that the appropriate beam harmonic travels slightly faster than the synchronous velocity. (Author)

AD-276 659 Div. 8, 25
(TISTM/EJH) OTS price $1.60

Grace, W. R., and Co., Clarksville, Md.
REPRODUCIBLE THERMISTOR REFINEMENT PROGRAM.
Interim technical progress rept., 5 Mar-4 June 62,
by M. C. Vanik, W. T. Barrett and others.
June 62, 10p. incl. tables.
(Contract AF 33(657)7104)
(ASD 7-838, vol. 3) Unclassified report

DESCRIPTORS: *Thermistors - Production, *Semiconductors, *Silicon - Impurities, *Single crystals. Temperature sensitive elements, Chemical impurities, Gold, Sensitivity, Reliability, Reproduction, Manufacturing methods.

Thermal instability of gold-doped monocrystalline silicon thermistors arose as a problem just prior to the operation of the pilot line. Annealing and improvements in the contact process should be the answer to this problem. In P-type silicon the resistivity of the float zone-leveled product increases as the resistivity of the starting P-type silicon increases. This relationship will be useful for production purposes. The time constants of our thermistors compare favorably with that of the AMT-4 radiosonde thermistor. Thermistors coated with silicone enamel and silicone rubber in thin films had smaller time constants than the radiosonde thermistor. All thermometers were calibrated against an N.B.S. calibrated platinum resistance thermometer. This calibration revealed some large but relatively constant errors in the toluene thermometers measuring below 0 C. Nickel resistance thermometers are being used. Two techniques have been tried to effect the final size adjustment of the thermistors. Vapor blasting was discarded because of cooling effects while cutting. Miniature high-speed grinding works well and will be used for production purposes. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-276 668 Div. 8, 30
(TISTE/CDM) OTS price $7.60

Philco Corp., Palo Alto, Calif.
PORTABLE S-BAND RADIOMETER FOR ANTENNA NOISE STUDIES.
Technical documentary rept.,
by G. L. Johnson. 9 May 62, 78p. incl. illus.
7 refs. (Rept. no. WDL-TR1793)
(Contract AF 04(647)532)
(SSD TDR 62-54) Unclassified report

DESCRIPTORS: *Radiometers - S band, *Antennas, *Radar antennas, *Noise analyzers, *Noise (Radar) - Measurement, *Noise (Radio) - Measurement. Design, Operation, Calibration, Tests, Microwave equipment, Test equipment, Test sets.

Efforts were devoted to the design, construction and operation of a portable S-band radiometer capable of measuring noise temperatures from 2 to 500 K. The radiometer was constructed for the specific purpose of measuring the noise temperature of the 60-ft T&D antenna. The results of these measurements will be used to determine the applicability of low noise receivers to the present tracking and data receiving system. The radiometer is useful for purposes other than antenna noise studies. Among these are antenna boresighting, measurement of loss in microwave components, and measurement of excess noise temperature of low noise receivers. The theory of operation of the radiometer is discussed along with the operating and calibrating procedures and descriptions and diagrams of the sub-units. A summary of results of tests on the 60-ft Vandenberg antenna is also included. (Author)

AD-276 674 Div. 8
(TISTE/CAM) OTS price $2.60

Radio Corp. of America, Somerville, N. J.
PRODUCTION ENGINEERING MEASURE ON 300 WATT SILICON AUDIO TRANSISTOR.
Quarterly rept. no. 3, 1 Jan-31 Mar 62,
by S. Silverstein and Z. Chang, ed. by A. L. Leotti.
31 Mar 62, 19p. incl. illus. tables.
(Contract DA 36-039-sc-85968)
Unclassified report

DESCRIPTORS: *Transistors - Production, *Manufacturing methods. Design, Resistance, Processing, Electrical properties, Diffusion, Tests, Silicon, Audiofrequency.

Accomplishments concerning the 300 audio transistor program are presented. TA 2167 engineering samples are currently being made in the 1 1/16 inch double ended stud package. One advance device was delivered. All TA 2167 fabrication operations are being performed in the Model Shop or the manufacturing area. Efforts are being directed toward more efficient and uniform operations. A correlation plot of 5-amp h(FE) versus 10-amp h(FE) is presented. New limits for the 5-amp h(FE) are proposed. Electrical data on delivered engineering samples are included. (Author)

AD-276 675 Div. 8, 26
(TISTE/CAM) OTS price $4.60

RCA Industrial Tube Products, Lancaster, Pa.
PRODUCTION ENGINEERING MEASURE TUBE TYPE A2582A (RCA 7801).
Quarterly rept. no. 7, 1 Jan-31 Mar 62,
by Ben Sheren. 31 Mar 62, 38p. incl. illus. tables.
(Contract DA 36-039-sc-85947)
Unclassified report

DESCRIPTORS: *Electron tubes - Manufacturing methods, *Production - Electron tubes. Processing, Brazing, Materials, Coatings, Electric discharges, Electrodes, Feasibility studies, Design, Test equipment, Tests.

Progress was continued to establish the manufacturing capability and facilities for the production and improved producibility of electron tubes. The ribbed screen method was discarded because of the distortion introduced by the coining tool. The grid coating approach utilizing the cataphoretic method of application was successful when the standard emission coating bath was tried. Further improvement in choice of material is undergoing investigation. An improved exhaust socket was tried and seemed satisfactory except for the method of mounting, which will be modified to permit removal from the equipment frame. The life test rack was converted to 1000 mc operation; performance was excellent. Design approval tests were successfully performed. Test data are shown. A reproducible method of establishing instrument setup by means of copper and teflon is described. Progress made in developing the laminated electrode is presented. (Author)

AD-276 697 Div. 8
(TISTP/JW) OTS price $9.10

Syracuse U. Research Inst., N. Y.
AN INFORMATION THEORY FOR TIME-CONTINUOUS PROCESSES,
by R. Y. Huang. May 62, 99p. incl. illus.
25 refs. (Rept. no. EE 894-625TN1; Technical rept. no. 1)
(Contract AF 30(602)2543, Proj. 5581)
(RADC TDR 62-202) Unclassified report

DESCRIPTORS: *Communications theory. Signal-to-noise ratio, Mathematical logic, Functions, Information theory.

AD-276 699 Div. 8
(TISTE/CDM) OTS price $5.60

Hughes Aircraft Co., Culver City, Calif.
TIME DOMAIN ANTENNA TECHNIQUES,
by T. S. Fong, F. G. Terrio and others. Oct 61, 46p. incl. illus. table, 7 refs. (Rept. no. P61-22)
(Contract AF 30(602)2410, Proj. 4506)
(RADC TN 61-290) Unclassified report

DESCRIPTORS: *Coupled antennas - Linear systems, *Radar antennas, *Antenna radiation patterns, *Radar scanning - Theory. Design, Mathematical analysis, Tests, Measurement, Time, Electronic switches, X band, Radar transmitters, Radar receivers, Switching circuits.

Time modulation of array antennas was applied to the problems of obtaining ultra-low sidelobe and simultaneously scanned antenna patterns. A design analysis is presented for a linear array which obtains reduced sidelobe levels by on-off switching of the individual array elements and subsequent filtering of the array output signal. A simplified experimental array design is presented, and the switching circuitry developed for this ultra-low sidelobe array is described. Stable transmitting and receiving equipment, designed for time domain applications, is discussed and performance characteristics of the equipment are given. The final results of the tests of the antenna pattern range are presented. Measurements to determine the repeatability of low sidelobe patterns are discussed. It is concluded that 40 db sidelobes can be measured to within

±1.5 db on the present range. The basic theory of the technique of simultaneous scan is given. An experimental array and its required control circuitry are under development. (Author)

AD-276 712 Div. 8, 15
(TISTP/WH) OTS price $10.10

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
GRAPH THEORETICAL ASPECTS OF ADMITTANCE AND IMPEDANCE MATRICES,
by J. D. Douglass, Jr. 30 Nov 61, 115p. incl. illus. table, 3 refs. (Research rept. no. EE 522; Technical rept. no. 69)
(Contract DA 36-039-sc-85272)
Unclassified report

DESCRIPTORS: *Electrical networks. Electrical engineering, Matrix algebra, Topology.

This analysis is concerned with the realization of RLC admittance and impedance matrices. It establishes necessary and sufficient conditions, in terms of direct synthesis procedures, for the realizability of n th order Y or Z matrices. Each independent branch of the resulting structure is a two-terminal driving-point impedance in series with a voltage source, or a two-terminal driving-point admittance in parallel with a current source. Each dependent branch is a two-terminal driving-point admittance or impedance. (Author)

AD-276 720 Div. 8, 13
(TISTW/DLW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
OPTIMAL SCHEDULING OF REPLACEMENT AND INSPECTION,
by D. W. Jorgenson and J. J. McCall. May 62, 44p. 15 refs. (Research memo. no. RM-3098-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Scheduling - Maintenance, *Maintenance - Costs, *Electronic equipment - Failure (Mechanics). Test methods, Reliability, Management engineering, Quality control, Mathematical analysis, Military requirements.

The results are summarized of research on the optimal scheduling of replacement and inspection of equipment for which the preparedness model is appropriate. Periodic policies are discussed for inspection or replacement of equipment consisting of a single stochastically failing module. Techniques are given for computing optimal inspection or replacement intervals, first under the assumption that the distribution of times to failure of the stochastically failing module is known, and secondly under the assumption that the form of the distribution is known but the failure rate is unknown. Optimal policies are discussed for replacement, for inspection, and for both jointly. The formal analogy is demonstrated between minimization of cost and minimization of the proportion of downtime. (Author)

AD-276 730 Div. 8
(TISTE/CAM) OTS price $5.60

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
LINEAR THEORY OF TRAVELING-WAVE TUBES,
by H. R. Witt. 1 Mar 62, 47p. incl. illus. 5 refs. (Technical rept. no. 7; Research rept. no. EE 526)
(Contract DA 36-039-sc-87368)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Backward-wave amplifiers, *Backward-wave oscillators. Coupling circuits, Electronic circuits, Helixes, Electron tubes, Space charges, Electron beams, Propagation, Impedance, Wave analysis, Harmonic analysis, Theory, Mathematical analysis, Equations.

A linear theory is developed for traveling-wave tubes that is based upon a periodic model for the slow-wave structure. In the application of this theory, as many space harmonics as desired can be included. If only the fundamental spatial components are retained, the theory reduces to a form that is in close agreement with J. R. Pierce's theory of the forward-wave amplifier. Similarly, if only the dominant space harmonics of backward-wave operation are retained, the results are essentially the same as those found by H. R. Johnson. (Author)

AD-276 744 Div. 8, 25
(TISTM/TCG) OTS price $4.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
DETERMINATION OF ELECTRONIC PROPERTIES OF SEMICONDUCTING MATERIALS.
Final rept., 15 Apr 60-15 Oct 61, on an Investigation of Surface Barriers on Semiconductors and their Influence on Contact Properties,
by R. M. Showers, Jurij Maczuk, and I. M. Naqvi. 15 Dec 61, 40p. incl. illus. tables, 23 refs. (Rept. no. 62-05)
(Contract DA 36-039-sc-85129, Proj. 3A99 20-001)
Unclassified report

DESCRIPTORS: *Semiconductors - Photoconductivity, *Silicon - Surface properties, *Crystals - Electrical properties. Materials, Surfaces, Measurement, Determination, Resistance, Photoelectric effect, Theory, Oxidation, Pickling.

Values of surface potentials for etched and oxidized surfaces p- and n-type Si crystals were obtained from the measurements of surface photovoltage and photoconductivity. The p-type samples had resistivities ranging from 1 to 3400 ohm-cm and those of n-type from 1.1 to 1100 ohm-cm. Surface potentials on etched and oxidized n-and p-type Si crystals were as high as 1 v and, except for n-type etched crystals, appeared to increase (in absolute value) with increasing resistivity. The surface potential of both p- and n-types decreased by about 21 kT/e after oxidation. Surface photovoltage values of 1.2 kT/e for 520 ohm-cm silicon and -0.9 for 46 ohm-cm silicon were obtained. These may be compared with values of 0.14 ev obtained. The oxidized surfaces prepared were stable over several weeks. However, indications are that after several months the high surface voltages deteriorate to values more in line with theoretical values. (Author)

AD-276 826 Div. 8
(TISTE/CAM) OTS price $9.60

Vitro Labs., West Orange, N. J.
DESIGN CRITERIA FOR RELIABLE TRANSISTORIZED ASSEMBLIES.
Final engineering rept., 1 Mar 59-1 July 61. 1 Oct 61, 1v. incl. illus. tables (Rept. no. VL-2160-6-0)
(Contract NObsr-77531)
Unclassified report

DESCRIPTORS: *Transistors, *Transistor amplifiers, *Electronic circuits - Reliability. Radiofrequency oscillators, Radiofrequency amplifiers, Radiofrequency generators, Radiofrequency filters, Sound generators, Detectors, Electronic equipment, Voltage, Cooling, Aging, Packaging, Manufacturing methods, Failure (Mechanics), Mathematical prediction, Reliability, Life expectancy, Measurement, Model tests, Test equipment, Resistors, Capacitors, Coils, Diodes.

Effort continued on a study of the effects of variations in transistor and other component parameters on the circuit performance of General Usage Assemblies. The information derived from this program is necessary to determine the design criteria for reliable transistor assemblies. Data are presented on the control of primary design factors effecting circuit reliability, compensating circuits used to minimize the effects of transistor variations, methods for accelerating transistorized assembly life tests, and modifications of existing failure predictions rates to provide the circuit designer with guidelines for designing reliable transistorized assemblies. (Author)

AD-276 845 Div. 8
(TISTE/CAM) OTS price $17.00

Clevite Corp., Cleveland, Ohio.
LOW FREQUENCY GYRATOR DEVELOPMENT.
Final rept.,
by D. R. Curran, J. H. Silverman and others.
31 Jan 62, 266p. incl. illus. tables, 31 refs.
(Contract AF 30(602)2202, Proj. 4519)
(RADC TDR 62-195) Unclassified report

DESCRIPTORS: *Transducers, *Piezoelectric transducers, *Magnetostriction transducers, *Electromechanical converters, *Transmission lines. Microwave networks, Electronic circuits, Electrical networks, Theory, Synthesis, Mathematical analysis, Electric fields, Magnetic fields, Coupling circuits, Hall effect, Broadband, Ferroelectric materials, Ferromagnetic materials, Ceramic materials, Piezoelectric materials, Phase shifters, Matrix algebra, Magneto-optic rotation.

Two electromechanical (em) gyrator designs, with coupled piezoelectric and piezomagnetic transducers, were used to cover the frequency range from 375 cps to 1.1 Mc, with bandwidths from 1.0 to 3.7% and power insertion losses below 2 db except at the extreme ends of the range. By combining piezoelectric and piezomagnetic transducers with complementary frequency-temperature dependencies, em gyrators were obtained with characteristics stable within ± 0.1% over the -40 to + 100 C range. Neutralization of em gyrators to form isolators was accomplished by adding appropriate reciprocal networks in parallel with the em gyrator to cancel one of its transfer admittances at one or more frequencies. Stop direction characteristics, ranging from a single notch of high rejection to those of broadband isolators with 20 db of isolation over the 9% bandwidth of the pass direction, were obtained with forward power insertion losses of 1 to 3 db. The em gyrator can also form an effective 3 channel circulator. Low frequency Hall effect gyrators have been investigated as multiterminal devices. (Author)

AD-276 880 Div. 8, 30
(TISTB/AW) OTS price $8.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ABSTRACTS. SCIENTIFIC AND ENGINEERING PAPERS.
Rept. for 15 Apr 60-15 Apr 62.
June 62, 96p.
(Contract AF 19(604)7400)
(AFESD TDR 62-94) Unclassified report

DESCRIPTORS: *Scientific reports, *Radar, *Microwaves, *Digital computers. Magnetic effects, Switching circuits, Electroencephalography, Superconductors, Radar antennas, Crystals, Quantum mechanics, Semiconductors, Microwaves, Information theory, Moon, Films, Radar signals, Radio waves, Radar reflections.

Abstracts of journal articles and meeting speeches written by Lincoln Laboratory authors and published or accepted for publication between 15 April 1960 and 15 April 1962 are listed. Included are abstracts of these submitted for advanced degrees during the same period. The 1960 edition covered the period from 1 July 1956 to 15 April 1960. A still earlier volume, now out of print, included abstracts from the period 1 July 1954 to 30 June 1956. (Author)

AD-276 888 Div. 8
(TISTE/CAM) OTS price $4.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
THE DIELECTRIC PLATE ANTENNA,
by Russell J. Wagner, Jr. Jan 62, 48p. incl. illus. table, 7 refs. (ASRDL technical rept. no. 2240)
Unclassified report

DESCRIPTORS: *Antennas, *Radar antennas, *Parabolic antennas. Communication equipment, Superhigh frequency, Radiofrequency power, Sheets, Dielectrics, Plastics, Expanded plastics, Polymers, Styrenes, Antenna radiation patterns, Measurement, X band, Standing wave ratios.

A flat dielectric plate placed in front of an antenna aperture increases the power gain of the aperture without increasing the physical area. The gain can be further increased by moving a single or double dielectric plate array gradually away from the aperture. Polystyrene and Eccofoam dielectric plates varying in thickness were used in experiments to determine which plate or combination of plates, placed at different spacings before an aperture, would produce the greatest gain. Measurements were made over the frequency range of 8000 to 8500 mc. Eccofoam plates (dielectric constant, 5.0) were found to give greater power gains than polystyrene plates (dielectric constant, 2.55). Best results were obtained from an array comprised of two Eccofoam plates 1/4-in. and 5/16-in. thick at spacings of 1-1/2 and 2-1/4 in. from the aperture. Information derived from these experiments was given practical application in the construction and testing of a low-silhouette antenna. (Author)

AD-276 894 Div. 8
(TISTE/CAM) OTS price $5.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept. no. 1, 1 Sep 61-31 Jan 62.
28 Feb 62, 46p. incl. illus.
(Contract AF 33(657)8460)
Unclassified report

DESCRIPTORS: *Antennas, *Helical antennas, *Lens antennas, *Conical antennas, *Coupled antennas. Broadband, Antenna couplers, Analysis, Impedance matching, Impedance, Electro-

magnetic waves, Propagation, Focusing, Antenna radiation patterns, Reflectors, Cerenkov radiation, Waveguides, Snells law, Wave transmission, Numerical analysis.

Contents:
Analysis of log-periodic antennas
The backfire helical antenna
Log-periodic magnetic-current antennas
Log-spiral antennas
Simple arrays of conical spiral antennas
Impedance properties of curved wire antennas
Antenna impedance transforming network
Collecting systems containing active and/or non-linear elements
An investigation of the near fields on the conical log-spiral antenna
Rectilinear spiral antennas
Wave propagation in helical structures
Investigation of tapered-period corrugated surfaces
Focusing of radiation from a bunched Cerenkov beam
Radiating lens illuminated from a Goubau beam waveguide
Transmission between antennas when the far-field approximation does not apply
Zone phase plates

AD-276 897 Div. 8
(TISTE/CAM) OTS price $4.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES.
Interim development rept., 22 Feb-22 May 62,
by R. H. Clayton. 12 June 62, 42p. incl. illus. tables, refs.
(Contract NObsr-87264)
Unclassified report

DESCRIPTORS: *Storage tubes, *Cathode ray tubes, *Image converter tubes. Electron lenses, Electromagnetic lenses, Image intensifiers (Electronics), Cathode tube screens, Phosphors, Electron beams, Focusing, Display systems, Optical images, Collimators, Electrostatics, Photoelectrons, Design, Tests.

This report includes:
MECHANICAL COLLIMATION OF IATRON IMAGE SECTION, by R. Clayton. 27 Apr 62 (Research rept. no. 169)
ON THE DESIGN OF AN IATRON WITH SOLENOIDAL FOCUS FIELD, by R. H. Clayton. 7 June 62, rev. 19 June 62 (Research memo. no. 363)

Elemental aperture lenses in the storage mesh of Iatron display storage tubes form highly divergent cones of flood electrons in the phosphor region which greatly reduce resolution at high brightness levels. Solution of this problem may be achieved, in general, by: (1) weakening aperture lenses, (2) reconverging elemental cones, and (3) gross electrostatic or magnetic focus of the entire storage screen. The general solutions listed above were expanded into specific approaches, and an estimate of the relative promise of each was attempted. The technologies which presently limit mechanical collimation are described. Gross magnetic focusing options are explored theoretically. Both theoretical and experimental data are presented relevant to electrostatic microlens design. A technology of mesh thickening is described in detail. (Author)

AD-276 905 Div. 8
(TISTE/CAM) OTS price $2.60

Mitre Corp., Bedford, Mass.
THE CRITICALLY COUPLED FILTER AT MICROWAVE FREQUENCIES,
by J. H. Philips, R. D. Gallagher, and W. M. Bridge. May 61, 19p. incl. illus. tables.
(Technical series rept. no. 4)
(Contract AF 33(600)39852, Proj. 750)
(ESD TDR 62-150) Unclassified report

DESCRIPTORS: *Radiofrequency filters, *Bandpass filters, *Waveguide filters, *Low pass filters. Broadband, Narrowband, Microwave frequency, Impedance, Electrostatic capacitance, Inductance, Polynomials, Transformations, Synthesis, Inverter circuits, Phase shifters, Design, Impedance matching, Microwave equipment, K band, X band.

Design expressions are developed for critically coupled, bilaterally matched filters at microwave frequencies. The expressions result in a design applicable to both broad-band and narrow-band filters for low as well as high frequency ranges. (Author)

AD-276 916 Div. 8
(TISTP/JW) OTS price $5.60

Northeastern U., Boston, Mass.
TECHNIQUES FOR THE CONSTRAINED OPTIMIZATION OF COMMUNICATION NETS,
by Louis Philip Costa. 15 May 62, 47p. incl. illus. tables, 23 refs. (Scientific rept. no. 8)
(Contract AF 19(604)4573, Proj. 5632)
(AFCRL 62-338) Unclassified report

DESCRIPTORS: *Communication systems, *Linear programming, *Matrix algebra. Costs, Radio communication systems, Mathematical analysis, Telephone communication systems, Telegraph systems, Microwave networks, Electrical networks.

The synthesis of ordinary linear graph models of communication nets whose elements are constrained in capacity, interconnection, and cost is covered. An optimal synthesis is identified as a minimum-cost realization of arbitrarily specified requirements on terminal capacity and topological structure. In particular, three classes of communication nets are considered. Wire nets, possessing communication links of finite capacity, are characterized by graphs whose branches are weighted to reflect this capacity. A method is given that yields models of this class at minimum cost. Radio nets, with communication centers of finite capacity, are described by graphs whose nodes are correspondingly weighted. A technique is developed that generates models of this class, also at minimum cost. Mixed Nets, composed of communication centers and links, each with limited capacities, are represented by graphs with weighted nodes and branches. A procedure is proposed that leads to minimum-cost realizations for graphs whose node costs are uniform. (Author)

AD-276 940 Div. 8, 25
(TISTE/CAM) OTS price $2.60

Schwinger, Julian, Cambridge, Mass.
INVESTIGATION OF HIGH FREQUENCY LIMITATIONS IN MILLIMETER WAVE GENERATORS.
Final rept., Jan-June 62,
by Julian Schwinger. June 62, 25p.
(Contract DA 36-039-sc-87445, Proj. 3A99-13-001-05)
Unclassified report

DESCRIPTORS: *Radiofrequency generators, *Harmonic oscillators, *Microwave oscillators, *Masers. Quantum mechanics, Matrix algebra, Equations of state, Integral transforms, Perturbation theory, Noise (Radio), Time, Measurement, Statistical functions, Electric

fields, Electromagnetic fields, Cavity resonators, Field emission, Molecular beams, Transients, Tests.

The relationship between the uncertainty principle and minimum amplifier noise is examined. First, the concept of coherence is discussed, and an incoherence parameter is defined in terms of the uncertainty that enters into the uncertainty principle. Harmonic oscillator states are examined for coherence. The concept of noise is then discussed and contrasted with incoherence. It is shown, with illustrations, that the two concepts are different, and that an incoherent field of a cavity mode need not exhibit noise. Spontaneous emission is examined both for coherence and noise. The origin of fundamental noise in an amplifier is shown to come from spontaneous emission of the amplification mechanism. The physical significance of the zero-point field is shown to consist only of a formal contribution to spontaneous emission, provided the amplifying mechanism is treated quantum-mechanically. (Author)

AD-276 953 Div. 8
(TISTE/CAM) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
BEAM-TYPE PARAMETRIC AMPLIFIER.
Technical note no. 5, 1 Jan-31 Mar 62, by R. Eng, I. Itzkan, and E. Cheatham. Apr 62, 15p. illus. 7 refs. (Rept. no. NA-8210-8264-5)
(Contract AF 30(602)2433, Proj. 5573)
(RADC TN 62-232) Unclassified report

DESCRIPTORS: *Parametric amplifiers - Design, *Microwave amplifiers. Coupling circuits, Electron beams, Electronic circuits, Feasibility studies, Cyclotrons, Wave transmission, Propagation, Helixes, Impedance, Electron guns, Magnetic fields, Radiofrequency power, Noise (Radio), Broadband, Narrowband, X band, K band, Algebra, Integral transforms, Tests.

Research continued in an effort to demonstrate the feasibility of two beam-type parametric amplifiers, one capable of narrowband voltage-tuned operation and the other capable of broadband untuned operation. A modified quadrifilar helix was constructed and cold tested; it showed reasonably high interaction impedance. The experimental apparatus for the Kompfner dip measurements is being assembled. Magnetic field shaping required for good beam focusing is discussed. A method to improve the coupler propagation characteristics by using a shield is being investigated. Brillouin flow beam in connection with orbit pumping is advantageous because the scallop wavelength is 40% off synchronization. The high noise content of a convergent-flow Brillouin beam can be reduced by good noise stripping; except for the physical complexity, multiple-stage stripping is an effective system for accomplishing this. Some multiple-mode problems can be satisfactorily handled by applying the Laplace transform method to the coupled-mode system. In particular, the problem of small loss on the coupler and on the beam can be investigated theoretically. (Author)

AD-276 964 Div. 8, 5, 24
(TISTA/VGW) OTS price $1.60

Westinghouse Electric Corp., Elmira, N. Y.
APPLIED RESEARCH ON TSEM IMAGE AMPLIFICATION CAMERA TUBE.
Interim engineering rept. no. 2, 16 Sep 61-15 Mar 62, by J. Kalafut, W. O. Mansfield, and H. Shabanowitz. 21 June 62, 11p. illus.
(Contract AF 33(616)8017, Proj. 4156)
Unclassified report

DESCRIPTORS: *Image intensifiers, *Photomultipliers, *Camera tubes. Iconoscopes, Photoemission, Films, Semiconducting films, Antimony, Cesium.

A summary of work performed on transmissive secondary emission (TSE) films and their applications as pre-scanning beam amplifiers in camera tubes for low light level performance is presented. The work performed involves a feasibility study of intensifier-orthicon devices employing TSE amplification. In general, two approaches were pursued. One is an intensifier-orthicon which utilizes TSE films as pre-scanning beam dynodes in the image section in combination with a thin film storage target. The other approach is the use of a high gain, low density film as a TSE-EBIC (transmission secondary emission-electron bombardment induced conductivity) storage target in an orthicon structure. (Author)

AD-276 972 Div. 8
(TISTE/CDM) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
A GREGORIAN CORRECTOR FOR SPHERICAL REFLECTORS, by F. S. Holt and E. L. Bouche. Apr 62, 13p. incl. illus. table, 12 refs. (AFCRL-62-163)
Unclassified report

DESCRIPTORS: *Radar antennas - Focusing, *Radar reflectors, *Radar scanning - Corrections, *Antenna horns. Theory, Tests, X band, K band, Mathematical analysis, Transmission lines, Design, Spheres.

Research was conducted on spherical reflecting surfaces for wide-angle scanning antennas. The inherent spherical aberration of a spherical reflector antenna is corrected by using an auxiliary Gregorian reflector feed system that rotates about the center of curvature of the reflector. Tests at both X- and K-band frequencies demonstrated feasibility of the design for wide-angle scanning. (Author)

AD-276 987 Div. 8
(TISTM/BRW) OTS price $8.10

Armour Research Foundation, Chicago, Ill.
EVALUATION OF SILICON METALLIC RECTIFIERS.
Final engineering rept., 1 July 58-31 Oct 61, by B. F. Lathan. 31 Oct 61, 80p. incl. illus. tables, 6 refs.
(Contract NObs-72444)
Unclassified report

DESCRIPTORS: *Silicon - Rectifiers, *Crystal rectifiers. Life expectancy, Temperature, Time, Tests, Test methods, Sampling.

Type 1N540 rectifiers were subjected to life experiments at different ambient temperatures to determine three points on a curve of operating life versus ambient temperature. Rectifiers were tested at temperatures of 170, 185, and 200 C; all units were subjected to 500 milliamperes average forward current and 280 v, 60 c. The tests were continued to 10,000 hours. Considerable differences were observed in the performance of rectifiers from the different manufacturers under given test conditions. The life data were analyzed and plotted to yield the observed reliability functions, and from these estimates the operating life was tabulated for each ambient temperature, at 5 and 50% failure of the test

specimens. Few failures were exhibited by the environmental group tested at 170 C, and consequently, its life data were not very sensitive to evaluation. The operating life at this ambient temperature, for 50% failure, exceeded the 10,000 hr of experimental observation. (Author)

AD-276 989 Div. 8
(TISTE/CAM) OTS price $2.25

Armour Research Foundation, Chicago, Ill.
EVALUATION OF SILICON METALLIC RECTIFIERS.
Final rept., 1 July 57-31 Mar 61,
by B. F. Lathan. 31 Mar 61, 90p. incl. illus. tables, ref.
(Contract NObs-72332)
Unclassified report

DESCRIPTORS: *Rectifiers, *Crystal rectifiers, *Diodes. Silicon, Electronic circuits, Temperature, Direct current, Voltage, Failure (Mechanics), Measurement, Life expectancy, Reliability, Test equipment, Instrumentation, Tests, Thermal stresses, Semiconductors.

Life tests were conducted on 100 1N538 medium-power silicon rectifiers, or equivalent. Groups of 10 diodes, from each of five manufacturers, and for each of two experimental conditions 85 C ambient temperature, 650 milliamperes dc forward current, and 134.5 volts rms inverse voltage; and 100 C ambient temperature, 500 milliamperes dc forward current, and 134.5 volts rms inverse voltage were tested for 17,264 hours. The diode characteristics were measured at time intervals dictated by the anticipated failure frequency. The ambient temperature conditions of the two stress levels were raised to 150 and 170 C, respectively, at 17,264 hours of test, to accelerate failures. Totals of 36 diodes and 25 diodes respectively failed catastrophically in the two stress groups during the total accumulation of over 26,000 hours. At 150 and 170 C, totals of 28 and 15 catastrophic failures respectively occurred during an elapsed time of 9000 hours. It was found that catastrophic failure of a diode was not always preceded by a substantial increase of forward-voltage drop, and consequently, was not an adequate criterion of impending failure. (Author)

9. FLUID MECHANICS

AD-276 501 Div. 9, 25
(TISTP/JW) OTS price $8.60

Michigan U. Coll. of Engineering, Ann Arbor.
MEASUREMENTS OF THE CORRELATION BETWEEN THE FLUCTUATING VELOCITIES AND THE FLUCTUATING WALL PRESSURE IN A THICK TURBULENT BOUNDARY LAYER,
Technical rept.,
by C. E. Wooldridge and W. W. Willmarth. Apr 62, 85p. incl. illus. (Rept. no. 02920-2-T)
(Contract Nonr-122430)
Unclassified report

DESCRIPTORS: *Turbulent flow, *Fluid flow, *Boundary layer. Pressure, Surfaces, Convection, Velocity, Vector analysis.

Turbulent motion in a thick (5 inch) boundary layer with zero longitudinal pressure gradient produced by natural transition on a smooth surface was studied. Measurements were made of the space-time correlations between the fluctuating wall pressure and the fluctuating velocities in the layer, and between the fluctuating wall pressure and the time derivative of the fluctuating velocity normal to the wall. At any height in the boundary layer the convection speed of the velocity disturbance which was correlated with the wall pressure disturbances was the local mean speed. The correlation of the wall pressure with the longitudinal velocity was opposite in sign to the correlation of the pressure with the velocity normal to the wall. The measurement of the pressure-velocity time-derivative correlation shows that most of the wall pressure is produced by velocity fluctuations near the surface. The correlation has a measurable value only in the inner 0.4 of the boundary layer. A vector field of the pressure-velocity correlation data is presented. (Author)

AD-276 521 Div. 9, 30
(TISTP/JW) OTS price $7.60

James Forrestal Research Center, Princeton U., N. J.
AN EXPERIMENTAL STUDY OF THE DECAY OF TURBULENT ENERGY IN SEVERAL GASES AND AT HIGH AND LOW DENSITY,
by W. H. Webb. Jan 62, 71p. incl. illus. tables, 29 refs. (Rept. no. 598)
(Contract AF 49(638)465)
(AFOSR-2302) Unclassified report

DESCRIPTORS: *Turbulent flow. Anemometers, Density, Pressure, Reynolds number, Argon, Air, Helium, Fluid mechanics.

A hot-wire anemometer study of the decay of turbulent energy downstream of a grid in atmospheric pressure air, argon and helium and at several ambient pressure levels in air was carried out. A variable density low speed blowdown tunnel was employed which was operated over the range 0.2 to 8 atmospheres pressure. It was found in the decay measurements that above a grid Reynolds number, RM, of about 2,000 and at atmospheric pressure and above, an identical initial period decay law occurred independent of the gas employed or the ambient pressure level. There was no evidence indicating the invalidity of the continuum view of turbulence for this range. For RM below 1,000 or at low ambient pressure, however, a decrease in the normal turbulence intensity was found, the magnitude of which appeared to depend on the pressure level and the gas employed. (Author)

AD-276 544 Div. 9, 15
(TISTP/JW) OTS price $8.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
CALCULATION OF SUBSONIC CAVITIES WITH SONIC FREE STREAMLINES,
by Donald D. Fisher. 22 May 62, 91p. incl. illus. tables, 24 refs. (Technical rept. no. 22)
(Contracts Nonr-22511, Proj. NR-041-086 and Nonr-22537, Proj. NR-044-211)
Unclassified report

DESCRIPTORS: *Subsonic flow. Nonlinear differential equations, Compressible flow, Fluid flow, Boundary layer, Differential equations, Dynamics, Cavitation.

AD-276 570 Div. 9
(TISTA/WAW) OTS price $4.60

Giannini Controls Corp., Duarte, Calif.
DETAILED INSTRUCTIONS FOR THE USE OF PREVIOUSLY PUBLISHED DECAY-DAMPING RELATIONSHIPS,
by Albert G. Fonda. Apr 62, 39p. incl. illus. 3 refs.
(Contract AF 49(638)1015)
Unclassified report

Division 9 - FLUID MECHANICS

DESCRIPTORS: *Flutter - Airframes, *Elasticity. Aerodynamics, Damping, Operational calculus, Differential equations, Mathematical analysis.

A practical and accurate method of converting conventionally computed flutter data into the roots of aeroelastic system dynamic response is presented. These latter are currently found almost exclusively by test and almost never analytically because of severe computational difficulties. The differences and similarities between these two sets of parameters are delineated and discussed. The computational procedure presented in this report related the flutter roots to the system dynamic response roots by establishing, in closed form, the rate of change of the latter with the former. As is shown, this rate of change is fortunately tolerant of aerodynamic complexity, and furthermore it can be calculated with little or no knowledge of the original system; that it, purely from the conventional flutter data itself. Step-by-step rules to guide this transformation are given in the first section of this report, accompanied by appropriate suggestions and aids to practical use. These are then demonstrated in typical use. A second section proves the algebraic validity of the method. This section is presented separately so that the step-by-step procedure of the first section can be set forth with maximum clarity. (Author)

AD-276 589 Div. 9
(TISTA/VGW) OTS price $3.60

Pisa U. (Italy).
LINEARIZED SUPERSONIC FLOW OF AN AXISYMMETRIC JET IN A SUPERSONIC STREAM,
by Enrico Pistolesi and Marino Marini. Mar 62, 26p. illus. (Technical rept. no. 2)
(Contract AF 61(052)209)
(AFOSR 2792) Unclassified report

DESCRIPTORS: *Supersonic flow, *Jets. Gas flow, Boundary layer, Mathematical analysis.

The flow field around an axisymmetric supersonic jet issuing from a nozzle in a supersonic stream is studied by use of particular singularities, called pseudosources, disposed on the jet axis. A detailed development of method is given and used to calculate the jet boundary. (Author)

AD-276 626 Div. 9
(TISTP/DAW) OTS price $7.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
A SHOCK-TUBE MEASUREMENT OF THE RECOMBINATION RATE OF OXYGEN,
by Jack Wilson. 1962, 67p. incl. illus. 22 refs.
(Contract Nonr-40125)
Unclassified report

DESCRIPTORS: *Oxygen, *Recombination reactions. Dissociation, Measurement, Shock tubes, Shock waves, Instrumentation, Density.

The recombination rate of oxygen was measured in a shock tube. The shock tube is unconventional in that airfoils have been inserted to expand the flow, and a constant-area channel placed behind the airfoils; thus the shock tube is effectively a low-expansion-ratio shock tunnel. The gas in the tube is first dissociated and set in motion by the shock wave, then flows through the expansion waves created by the airfoils, and is cooled, and finally enters the constant-area channel, where it recombines. Measurement of the degree of dissociation along the constant area channel enables one to calculate the recombination rate of the oxygen atoms. The measured recombination rate constants are compared with those obtained by reflecting the known dissociation-rate constants through the equilibrium constant. (Author)

AD-276 714 Div. 9, 12
(TISTA/SEB) OTS price $9.10

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
A REVIEW OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufman, II, Stavros A. Hartofilis and others. Mar 62, 101p. incl. illus. tables, 252 refs.
(Contract AF 33(616)8130, Proj. 8219)
(ASD TDR 62-168) Unclassified report

DESCRIPTORS: *Hypersonic flow - Separation, *Hypervelocity vehicles - Control. Gas flow, Turbulent boundary layer, Wing-body configurations, Pressure, Aerodynamics, Boundary layer, Hypersonics, Heat transfer, Shock waves, Laminar boundary layer, Spikes, Control surfaces, Flaps, Fins, Bibliography, Supersonics.

A comprehensive review of high-speed flow separation and a review of available information pertaining to the effectiveness of aerodynamic controls for hypersonic vehicles are presented. Emphasis is on the problems associated with applying the existing information, which relates primarily to the low-supersonic speed range, to hypersonic flow situations. Sufficient detail is presented to allow this report to serve as a self-contained, introductory work on separation phenomena; available sources of specific types of control data are tabulated for ready access. (Author)

AD-276 819 Div. 9, 2
(TISTP/WH) OTS price $14.50

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
NOSE AND INLET SHAPES OF MINIMUM DRAG IN SUPERSONIC FLOW.
Rept. on Methods of Mathematical Physics,
by Karl G. Guderley, John V. Armitage, and Emma M. Valentine. May 62, 217p. incl. tables.
(ARL 62-342)
(Proj. 7071)
Unclassified report

DESCRIPTORS: *Aerodynamic configurations, *Supersonic planes, *Drag, *Duct inlets. Compressible flow, Gas flow, Fluid mechanics, Axially symmetric flow.

The classical problem of determining the shape of the forepart of an axial-symmetric body which, at given length and fineness ratio has minimum pressure drag, is usually solved by simplifying the flow equations. By making a suitable choice of the control surface for mass flow and momentum, a one-dimensional variational problem is obtained. The complicated system of differential equations that results is reduced to tolerable size by introducing a modification of an idea due to G. V. Rao who found in a similar system that part of the problem is soluble in closed form. The particular solutions thus obtained satisfy the boundary conditions nearly perfectly. The method is modified to take into account the known fact that an axial-symmetric body of minimum drag should have a blunt nose. The analysis develops the basic ideas underlying the formulation of the problem, describes the results in general, and shows computed inlet and closed body contours. (Author)

AD-276 822 Div. 9
(TISTA/WAW) OTS price $5.60

Stanford U., Calif.
METHOD FOR CALCULATION OF THE ONE-DIMENSIONAL NONEQUILIBRIUM FLOW OF A GENERAL GAS MIXTURE THROUGH A HYPERSONIC NOZZLE,
by George Emanuel and Walter G. Vincenti. June 62, 50p. incl. illus. tables, 13 refs.
(Contract AF 40(600)930, Proj. 8952)
(AEDC TDR 62-131) Unclassified report

DESCRIPTORS: *Hypersonic nozzles - Gas flow, *Hypersonic flow - Mathematical analysis. Aerodynamics, Recombination reactions, Differential equations, Numerical analysis, Digital computers, Programming, Hypersonics.

The work described is a continuation of that reported previously in AEDC-TN-61-65 (calculation of the one-dimensional nonequilibrium flow of air through a hypersonic nozzle). In particular, a method is presented for the exact numerical calculation of the one-dimensional nonequilibrium flow of a general gas mixture through a converging-diverging nozzle. General equations are given for a mixture of perfect gases with an arbitrary number of species undergoing an arbitrary number of chemical and vibrational rate processes. An inexact but accurate method, similar in form to the method employed in the nonequilibrium case, is also given for calculating the corresponding one-dimensional equilibrium flow. The numerical method of solution applicable to both cases is described, including a simple procedure for starting the nonequilibrium calculations from an equilibrium condition and an improved method for controlling integration step size. The factors that affect over-all computation time are discussed. A computer program for an IBM 7090 has been written for the general gas mixture. Specific calculations are reported for a model of air consisting of O, N, NO, N2, and O2 and including eight chemical reactions plus the vibrational processes of the three diatomic species. (Author)

AD-276 869 Div. 9, 25
(TISTP/JW) OTS price $13.50

Electrical Engineering Research Lab., U. of Illinois, Urbana.
NON-LINEAR RESPONSE OF PLASMAS TO ELECTROMAGNETIC WAVES AND SURFACE WAVE PROPAGATION IN MAGNETO PLASMAS,
by J. T. Verdeyen and L. Goldstein. 1 May 62, 181p. incl. illus. tables, 36 refs. (Scientific rept. nos. 4 and 5)
(Contracts AF 19(604)5565, Proj. 8653 and AF 19(604)3481, Proj. 8653)
(AFCRL 62-488) Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves. Fluid flow, Electrical properties, Nonlinear systems, Propagation, Displacement reactions.

The nonlinear interaction of an RF electromagnetic wave and a plasma, which is characterized by the generation of electromagnetic power at frequencies harmonically related to the applied frequency, is studied theoretically and experimentally. Various plasma mechanisms responsible for this nonlinear behavior are analyzed. One particular mechanism is analyzed in detail and experiments designed to verify this detailed analysis are described. Good agreement between theory and experiment is obtained. Closely related to the nonlinear study is the topic of propagation of electromagnetic waves in a plasma. It is found that there is a mode of propagation in a bounded magneto plasma which can be classified as a surface wave. This mode exhibits a non-reciprocal behavior similar to the effect found in a ferrite field displacement isolator. The relationship of the propagation constant and the field configuration of this mode to the plasma parameters is studied. Theory and preliminary experimental results are in qualitative agreement. (Author)

AD-276 874 Div. 9
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF VISCOSITY ON THE FLOW IN THE REGION OF A STRAIGHT COMPRESSION SHOCK,
by A. I. Zubkov and L. I. Sorkin. 2 May 62, 14p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-172 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, no. 1:pp. 114-120, 1961)
Unclassified report

DESCRIPTORS: *Boundary layer, *Compression shock, *Wind tunnels, *Viscosity, *Supersonic flow, *Subsonic flow, *Turbulent flow. Cylindrical bodies, Spark shadowgraph photography, Functions, Nozzles, Pressure, Mach number, Translations, USSR.

Investigations were conducted on the physical picture of the flow in the region of a straight compression shock and the localization of the separation that occurs as a result of the interaction between a straight compression shock and the boundary layer. (Author)

AD-276 909 Div. 9, 25
(TISTP/JW) OTS price $7.60

Northwestern U., Evanston, Ill.
ELECTRON DENSITY AND COLLISION FREQUENCY OF ARC-HEATED ARGON PLASMA,
by R. C. Warder, Jr., M. Brodwin, and Ali Bulent Cambel. Jan 62, 63p. incl. illus. tables, 13 refs.
(Contract AF 49(638)879)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electrical properties, *Argon. Fluid flow, Microwave probes, Interferometers, Attenuation, Measurement, Phase shifters, Temperature, Electron mass.

An investigation of the electrical properties of an argon plasma flow was conducted in an arc-heated plasma tunnel using microwave diagnostics. In particular, phase shift and attenuation measurements at 78 and 85.3 kmc were made to determine the electron density and electron collision frequency of the argon plasma. The electron densities as determined from the phase shift measurements at the two frequencies agree quite well and when compared with theoretical predictions indicate that the plasma flow is not in equilibrium. The attenuation measurements agree qualitatively; however, the experimentally derived electron collision frequencies do not agree with presently accepted theoretical predictions. Furthermore it has been shown that the infinite slab hypothesis which is assumed in many of the current microwave plasma studies was satisfied. The microwave interferometer method thus appears to be a reliable method for determining the electron density of plasma flows insofar as the infinite slab hypothesis is satisfied and the plasma electron density is below the cutoff value. (Author)

Division 10 - FUELS AND COMBUSTION
Division 11 - GROUND TRANSPORTATION EQUIPMENT

AD-276 910 Div. 9
(TISTP/TL) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE CALCULATION OF LAMINAR BOUNDARY LAYERS IN EQUILIBRIUM DISSOCIATED AIR BY AN EXTENSION OF THE COHEN AND RESHOTKO METHOD,
by Jay M. Solomon. Apr 62, 36p. incl. illus. 19 refs. (Aeroballistics research rept. no. 166; NOLTR 61-143)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Heat transfer, *Hypersonic flow, *Blunt bodies, *Gases, *Air. Dissociation, Recombination reactions, Enthalpy, Sheets, Cylindrical bodies, Spheres, Viscosity, Friction, Surfaces, Density, Thermal conductivity, Pressure, Numerical analysis, Integration, Mach number, Reynolds number, Equations, Motion, Compressible flow.

The method of Cohen and Reshotko for calculation of compressible laminary boundary layer with heat transfer and arbitrary pressure gradient is extended to equilibrium dissociated air. Both products of density and viscosity and density and enthalpy must be assumed constant across boundary layer. Satisfactory results are obtained when product of density and viscosity is evaluated at reference enthalpy and product of density and enthalpy is evaluated at boundary layer edge.

AD-276 977 Div. 9
(TISTA/WAW) OTS price $9.10

Sikorsky Aircraft, Stratford, Conn.
A STUDY OF THE OPTIMUM ROTOR GEOMETRY FOR A HIGH SPEED HELICOPTER,
by John P. Rabbott, Jr. May 62, 10p. incl. illus. 3 refs. (Rept. no. SER-5-254)
(Contract DA 44-177-tc-548, Proj. 9R38-13-014-02)
(TCREC TR 62-53) Unclassified report

DESCRIPTORS: *Helicopter rotors - Mathematical analysis. Aerodynamics, Subsonic flow, Lift, Drag, Torque, Thrust, Vibration, Stresses, Mathematical analysis, Model tests, Wind tunnel models, Geometry, Aerodynamic configurations, Theory.

An analytical study was performed by Sikorsky Aircraft to evaluate the effects of modifications to helicopter rotor blade geometry, including root cutout, taper, and twist, on rotor performance and vibratory blade stress at high forward speeds. It was concluded that blade twist is the most fundamental parameter and that although moderate to high twist is optimum from performance considerations, theory indicated that a low value of twist is required to minimize vibratory stresses in forward flight and thereby insure high component reliability. Wind tunnel tests were conducted on 1/8 scale model blades representative of full scale Sikorsky S-56 main blades, with linear twists of -8 and -4 degrees. The experimental results verified that the lower twist rotor blades had substantial reductions in vibratory stress at a cost of about 5 percent increase in rotor power required in high speed cruise. (Author)

10. FUELS AND COMBUSTION

AD-276 713 Div. 10, 14
(TISTM/BRW) OTS price $9.10

Boeing Co., Seattle, Wash.
FEASIBILITY DEMONSTRATION OF THE DESIGN, FABRICATION AND TESTING OF FILAMENT WOUND FIBERGLASS LIQUID PROPELLANT TANKS.
Final rept.,
by D. Pollman and R. E. Jacobsen. May 62, 101p. incl. illus. tables.
(Contract AF 04(611)6006)
(SSD TR 61-45) Unclassified report

DESCRIPTORS: *Propellant tanks, *Filament wound construction, *Glass textiles. Liquid rocket propellants, Storage tanks, Feasibility studies, Design, Manufacturing methods, Tests, Epoxy resins, Laminates, Seals, Pressure vessels.

The report presents discussions and data derived from a program that investigated the feasibility of applying high-strength materials and advanced fabrication techniques to high-pressure, storable, liquid-rocket propellant tankage. The major design goal was to attain minimum weight tankage commensurate with performance requirements. Three 70-inch-diameter 210-inch-long tanks were filament wound with fiberglass yarn and epoxy resin. (Author)

AD-276 955 Div. 10, 4
(TISTA/SEB) OTS price $1.60

Texaco Experiment Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.
Quarterly summary rept., Feb-Apr 62,
by U. V. Henderson, Jr. and Harry P. Woods.
1 May 62, 15p. incl. illus. tables, 7 refs.
(Rept. no. TM-1346; EXP 223)
(Contract Nonr-188300)
Unclassified report

DESCRIPTORS: *Boron - Combustion. Fluorine, Gases, Chemical reactions, Boron compounds, Fluorides, Reaction kinetics, Temperature, Mass spectroscopy, Heat of reaction.

Studies of the reaction between elemental boron and fluorine gas continued in both the low-pressure microbalance apparatus and in the time-of-flight mass spectrometer. Corrosive failure of the mass-spectrometer apparatus prevented obtaining the refined data hoped for in the 800 to 1600 K temperature range, although the data available do indicate that at these temperatures BF was the principal species formed on the surface and that the reaction apparently changed to a lower activation energy mechanism when the temperature was raised to about 800 K. Rates obtained in the 525 to 630 K range in the microbalance apparatus gave an activation energy of about 19 kcal/mole, which suggests that the rate-controlling step in this region might be the dissociation of fluorine as it is adsorbed on the surface. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-276 543 Div. 12, 8, 6
(TISTW/DLW) OTS price $11.00

Smyth Research Associates, San Diego, Calif.
TARGET ACCURACY EXPERIMENT.
Feb 62, 139p. incl. illus. tables (Rept. no. SRA-242)
(Contract AF 30(602)2084)
(RADC TDR 62-137) Unclassified report

DESCRIPTORS: *Satellite vehicles - Position finding, *Electromagnetic waves - Atmospheric refraction, *Radio interferometers - Tracking, *Radio astronomy, *Radar tracking. Errors, Wave transmission, Doppler tracking, Refractive index, Measurement, Tests.

An experimental program is discussed which was designed to study the limitations imposed by the atmosphere in locating the position of a vehicle, within or above the earth's atmosphere. The fragmentary information available on atmospheric refraction of electromagnetic waves does not fulfill the needs of the sophisticated radar techniques of today. A study of low elevation angle (below 15 degrees) refraction was undertaken, since this is the region in which severe refraction occurs. The measuring equipment was required to resolve the position of an electromagnetic radiating source, i.e., satellite to 0.1 mr accuracy. In addition, it was required to know the exact location of the orbiting vehicle as a function of time. The approach taken was to implement a vertically based interferometer system (sea interferometer), and a doppler technique for the determination of satellite positions. The program is the first full scale refraction study designed to determine the actual limitations imposed by both the tropospheric and ionospheric regions of the atmosphere, both individually and collectively as contributors to the over-all problem of accurately positioning a vehicle in space. (Author)

AD-276 684 Div. 12
(TISTA/SEB) OTS price $1.60

Westinghouse Electric Corp., Baltimore, Md.
THREE DIMENSIONAL ORBITS WITH FIXED LOW THRUST,
by George Shapiro. 11 May 62, 10p. 4 refs.
(Contract AF 49(638)1002)
(AFOSR-2610) Unclassified report

DESCRIPTORS: *Orbital flight paths - Thrust. Sun, Space probes, Mathematical analysis, Determination, Theory, Equations, Motion.

The orbit of a satellite with an additional fixed low thrust in a fixed direction is extended to 3 dimensions. The orbital eccentricity and inclination oscillate between bounds independent of the low thrust level. Escape does not occur and the major axis remains constant. The applicability of the analysis to the behavior of the orbit of a satellite for solar observation is shown. (Author)

AD-276 721 Div. 12
(TISTW/RD) OTS price $4.60

RAND Corp., Santa Monica, Calif.
OPTIMAL REPLACEMENT POLICIES FOR A BALLISTIC MISSILE,
by D. W. Jorgenson and J. J. McCall. May 62, 41p. incl. illus. 11 refs. (Research memo. no. RM-3101-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Guided missiles - Maintenance. Surface to surface, Maintenance, Scheduling, Quality control, Failure (Mechanics), Reliability, Statistical processes, Costs, Rocket motors.

Ballistic missile system replacement policies are discussed for equipment subject to stochastic failures in which the actual state of the system, good or failed, is not known with certainty. Although these policies are applied only to the missile itself, optimal maintenance policies for the system as a whole are conceptually similar. The criterion employed for comparison of alternative maintenance policies is to minimize the total cost per expected piece of equipment good per period of time. Maximization of system reliability is a special case of this criterion which ignores the financial costs of maintenance actions. For illustrative purposes, optimal policies are computed for a hypothetical ballistic missile system. They are then compared with each other and with a rule of thumb frequently proposed for replacement policy: Replace at the mean time to failure. (Author)

AD-276 728 Div. 12
(TISTA/SEB) OTS price $4.60

Cologne U. (Germany).
RESEARCH ON THE PRACTICE AND IMPROVEMENT OF METHODS OF OBSERVING ARTIFICIAL EARTH SATELLITES.
Technical rept.,
by H. K. Paetzold. 1 Dec 61, 47p. incl. illus. 14 refs. (Technical rept. no. 1)
(Contract AF 61(052)314)
(ESD TDR 62-46) Unclassified report

DESCRIPTORS: *Satellite vehicles - Radar tracking, *Satellite vehicle trajectories, *Determination. Doppler tracking, Doppler radar, Photographic analysis, Radio signals, Drag, Mathematical prediction, Tests, Measurement.

Two different methods for the continuous tracking of satellites have been employed at several stations in West-Germany. Both observation methods, optical and radio, were improved during the tests. In addition, Doppler-shift observations and radio bearings were made. For the latter a modern direction finder is used. The accuracy of the photographic observations is about 0.01 sec in time and .002 degree in place while the errors of the radio bearings at 20 Mcs are considerably greater with values of 1 sec resp. 0.5 degree. Since the variable air drag causes one of the greatest uncertainties for the prognoses of satellites the vertical air density profile was determined with the observed acceleration of satellites. A pronounced variability was found due to several major extraterrestrial effects. It is possible to establish a model for the density variation to improve the predictions of satellites. (Author)

AD-276 855 Div. 12
(TISTA/SEB) OTS price $10.50

General Dynamics/Astronautics, San Diego, Calif.
ENVIRONMENTAL CONTROL STUDY OF SPACE VEHICLES. PART II. THERMAL ENVIRONMENT OF SPACE. SUPPLEMENT B. TABULAR PRESENTATION OF PLANETARY THERMAL AND PLANETARY ALBEDO RADIATION INCIDENT TO SPACE VEHICLES,

by John C. Ballinger and Emmet H. Christensen. 20 Jan 61, 129p. incl. illus. tables (Rept. no. ERR-AN-016, supp. B)

Unclassified report

DESCRIPTORS: *Temperature control - Space flight, *Controlled atmospheres - Spaceships, *Space environmental conditions - Thermal radiation, *Albedo (Astronomy). Closed-cycle ecological systems, Solar energy, Planets, Satellite vehicles, Configuration, Geometry, Bodies of revolution, Conical bodies, Cylindrical bodies, Heat, Heat transfer, Manned, Mathematical analysis, Equations, Tables.

AD-276 878 Div. 12
(TISTA/GEC) OTS price $9.60

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
MISSILE AND SPACECRAFT STRUCTURAL DESIGN AND ANALYSIS,
by E. E. Sechler. 1961, 110p. illus. (GALCIT SM 61-18)

Unclassified report

Presented at Stanford University - National Science Foundation Summer Institute, July 3-7, 1961.

DESCRIPTORS: *Guided missiles - Design, *Satellite vehicles - Design, *Spaceships - Design, *Airframes - Design, *Structures - Design. Configuration, Structural shells, Materials, Production, Transportation, Structures, Launching, Storage, Staging, Flight paths, Re-entry aerodynamics, Space environmental conditions, Temperature, Pressure, Tensile properties.

A discussion is given of the structural design and analysis of rockets, missiles and spacecraft. Changes in power plants, advances in fuel technology, introduction of new materials and methods for their fabrication and their impact on the boundary conditions within which the designer is constrained to work are discussed. New configurations and methods of analysis which will make significant contributions to the search for the optimum structure are also treated. (Author)

AD-276 908 Div. 12, 31
(TISTW/RD) OTS price $8.60

Naval Weapons Lab., Dahlgren, Va.
TERRIER STRUCTURAL FIRING TESTS ABOARD THE USS CONSTELLATION (CVA-64),
by J. W. Loving, T. I. Dodson and others. 5 June 62, 99p. incl. illus. tables, 3 refs. (NWL rept. no. 1814)

Unclassified report

DESCRIPTORS: *Guided missiles - Blast. Surface to air, Surface to surface, Hazards, Safety, Blast, Guided missile launchers, Shipborne, Aircraft carriers, Structures, Guided missile personnel, Launching, Shipborne, Safety, Poisonous gases, Gas leaks, Tests.

Sixteen TERRIER Mk 12 Mod 0 boosters with concrete slugs were fired aboard the USS CONSTELLATION (CVA-64) to investigate the adequacy of the protection for the TERRIER launching systems personnel against blast effects and to determine the effects of the booster blast on the ship's structure. During the test series, measurements of toxic gas leakage into personnel areas, sound pressure levels structural strains, air temperatures both inside and outside of the ship and flame indications near door seals were obtained. The results indicated large concentrations of toxic gases in personnel areas adjacent to the launchers, hot particles from the burning booster on the flight deck, and superficial structural damage. (Author)

AD-276 984 Div. 12, 27, 10
(TISTA/SEB) OTS price $6.60

Beech Aircraft Corp., Boulder, Colo.
DEVELOPMENT OF POSITIVE EXPULSION SYSTEMS FOR CRYOGENIC FLUIDS.
Final rept. on Phases II and III, 15 Jan-20 Nov 61,
by J. E. Bell, W. R. Killian and others. May 62, 57p. incl. illus. tables (Engineering rept. no. 13511)
(Contract AF 33(616)6930, Proj. 3084)
(SSD TDR 62-14)

Unclassified report

DESCRIPTORS: *Propellant tanks - Pneumatic devices, *Hydrogen - Ejection. Design, Fuel systems, Liquid rocket propellants, Space flight, Weightlessness, Cryogenics, Manufacturing methods, Heat transfer, Pressure regulators, Liquefied gases, Test equipment, Test methods, Hydrostatic pressure.

The operation instructions, prototype testing program, and the manufacturing procedures required to develop a prototype unit are presented for a Mylar film bladder for liquid hydrogen expulsion. A 27-gallon, liquid hydrogen expulsion unit was fabricated to test a series of three-ply Mylar bladders. The test program describes the data required and the test setup used to determine the heat transfer rate and the operational characteristics of the prototype system. A summary of problem areas, bladder failures and gas pressure regulator malfunctions has been included together with possible solutions. The report is summarized with a list of recommendations for future expulsion units. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-276 657 Div. 13
(TISTE/CDM) OTS price $16.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
STATIC AND DYNAMIC BEHAVIOR OF PORTAL-FRAME KNEE CONNECTIONS,
by Warren A. Shaw. 21 May 62, 251p. incl. illus. tables, 35 refs. (Technical rept. no. 183)

Unclassified report

DESCRIPTORS: *Beams - Load distribution, *Structures - Tests, *Girders - Steel, *Metal joints, *Flanges, *Welded joints. Construction, Dynamics, Blast, Simulation, Civil engineering, Buckling, Fatigue (Mechanics), Fracture (Mechanics), Mathematical analysis, Instrumentation, Test methods, Elasticity, Plasticity, Vibration, Measurement, Atomic bomb damage.

Twenty-three steel portal-frame knee connections were subjected to uniformly distributed static and dynamic loads along one leg of the connections. Three types of connections (square, curved, and tapered haunch knees) were tested in each of two loading configurations. The load was applied so that the inner flange of the connection was either in tension or compression. The connections were designed to join wide-flange steel sections about 16 in. in depth at an angle

of 90 degrees; each leg of the members was approximately 9 ft. long. The detailed results of the tests are evaluated, and comparisons are made of the various connections in regard to energy-absorbing capacity, stiffness, ductility, rotational capacity, and development of the fully plastic yield moment in the wide-flange beam. Measurements of pressure, deflection, reaction, strain, and acceleration are tabulated and the static and dynamic behavior of the connections is plotted graphically. Theoretical static and dynamic analyses of various connections and loading conditions are presented. (Author)

AD-276 700 Div. 13
(TISTB/AW) OTS price $2.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
ABSTRACTS OF REPORTS PUBLISHED BY ARMY MOBILITY RESEARCH CENTER UNDER PROJECT 8S70-05-001, TRAFFICABILITY AND MOBILITY RESEARCH.
Feb 62, 22p.
Unclassified report

DESCRIPTORS: *Soils, *Military transportation. Trafficability, Vehicles, Tracked vehicles, Sampling, Snow, Moisture, Tires, Military research, Reports.

AD-276 805 Div. 13
(TISTE/CDM) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
INSTALLATION FOR REMOVAL OF OIL AND MOISTURE FROM COMPRESSED AIR (Maslovlagootdelitel'naya Ustanovka Dlya Szhatogo Vozdukha),
by D. I. Rubanovich. 1961, 4p. incl. illus. table (Trans. no. T-1584)
Unclassified report

DESCRIPTORS: *Compressors, *Refrigeration systems, *Compressed air. Oils, Moisture, Disposal, Separation, USSR, Effectiveness, Tests.

A study was made of devices for the removal of oil and moisture from compressed air. Compressor difficulties arise due to condensation of moisture and deposition of oil in the compressed air lines. To avoid this, hot air is cooled before it is delivered to the air lines, and the moisture and the oil are condensed and removed insofar as possible directly at the compressor. For this purpose, a refrigerator and an oil-moisture separator are installed between the compressor and air collection point. A description is given of the refrigerator and the oil-moisture separator, and tests were conducted to demonstrate their effectiveness. (Author)

14. MATERIALS (NON-METALLIC)

AD-276 525 Div. 14, 25
(TISTM/BRW) OTS price $7.60

Quartermaster Research and Engineering Command, Natick, Mass.
TENSILE IMPACT ON RUBBER AND NYLON,
by Malcolm N. Pilsworth, Jr. May 62, 65p. incl. illus. tables, 17 refs. (Technical rept. no. PR-3)
Unclassified report

DESCRIPTORS: *Rubber, *Nylon. Stresses, Creep, Dynamics, Elasticity, Plasticity, Viscosity, Polymers, Photographic analysis, Stroboscopes.

A method was sought for describing the response of visco-elastic materials to loading when the velocity of strain propagation in the material is the controlling factor. A machine is described that delivers a longitudinal impact at about 150 ft/sec to a yarn or strip. The impact is photographed using a high-speed stroboscope and a moving mirror. Strain-time-position data are obtained from the picture. Results are given for the impact of a rubber strip. In another experimental technique the force at the fixed end of a nylon yarn during impact is measured. Tentative high-speed stress-strain curves were deduced, for the rubber from the photograph and for the nylon from another series of tests in which the acceleration of a tail mass was measured. Assuming that these curves hold during the impact with no time dependency, the strain patterns were computed by a method of characteristics given by von Karman, OSRD No. 365, 1942; OSRD No. 496, 1950; J. Appl. Phys., 21:987, 1950 and compared with the experimental results. The timing and strain levels of the measured pulses are well duplicated by the calculation. However, the calculated pulses have much steeper fronts than are observed. For both rubber and nylon, in order to describe the impact response it is necessary to include a creep function as well as a dynamic stress-strain curve. (Author)

AD-276 575 Div. 14, 4
(TISTM/EJH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
PROPERTIES OF THERMOSETTING POLYMERS AS EVIDENCED BY ELECTRICAL RESISTIVITY MEASUREMENTS,
by R. W. Warfield and M. C. Petree. 5 Jan 62, 34p. incl. illus. tables, 37 refs. (Rept. no. NOLTR 62-2)
Unclassified report

DESCRIPTORS: *Thermosetting resins, *Heat resistant polymers - Electrical properties, *Polymers - Molecular structure, *Epoxides. Resistance, Temperature, Polymerization, Copolymerization, Phase transitions, Glass, High temperature research, Pyrolysis, Stability, Electrical conductance, Urethanes, Esters.

An investigation of thermosetting polymer properties by electrical volume resistivity techniques is discussed. This approach yielded fundamental data sensitive to the structure of a polymer. It is possible to determine if a polymer is in configurational equilibrium. Explanations are given for the change in resistivity during polymerization, magnitude and temperature dependence of resistivity, glass transition, thermal stability and degradation of crosslinked polymers. For a number of amorphous polymers a linear relationship was found to exist between the logarithm of the magnitude of the resistivity at 25 C and the temperature dependence of the resistivity. The compensation law is observed to hold for the electrical conduction process in amorphous polymers. Evidence is presented which indicates that the glass transition in thermosetting polymers is a time-dependent relaxation process. (Author)

AD-276 583 Div. 14
(TISTM/EJH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE EFFECT OF EXPLOSIONS ON PLASTICS AND ELASTOMERS,
by H. E. Mathews, D. F. Shelton and others. 18 Dec 61, 4p. illus. tables, 3 refs. (Rept. no. NOLTR 61-156)
Unclassified report

Division 14 - MATERIALS (NON-METALLIC)

DESCRIPTORS: *Elastomers - Mechanical properties, *Plastics - Shock resistance, *Thermosetting resins, *Synthetic rubber. Phenolic resins, Polymers, Fluorides, Ethylenes, Composite materials, Glass textiles, Conical bodies, Explosives, Detonation, Lead compounds, Azides, Deformation.

The investigation represents an extension of work on the shock resistance of materials under suddenly applied loads. Six elastomeric materials and 11 rigid plastics were prepared in the form of conical specimens and subjected to shocks generated by charges of lead azide detonated at their base. An arctic SBR elastomer showed outstanding resistance to fracture and flow and was the only material tested which retained its shape and intactness at the maximum lead azide charge weight over the temperature range of -54 C to 71 C. Two thermoplastic polymers, Lexan and Cycolac, and a Nitrile-Phenolic elastomer showed good resistance to shock loading at 23 C and 71 C. Incomplete data indicate that Kel-F is highly resistant to plastic flow and spalling at the site of the explosion but sensitive to tip spalling at -54 C, whereas Teflon spalls appreciably at the site of impact but not at the tip. (Author)

AD-276 599 Div. 14, 25
(TISTM/BRW) OTS price $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
HIGH-POWER CHARACTERISTICS OF SINGLE-CRYSTAL FERRITES WITH PLANAR ANISOTROPY,
by Samuel Dixon, Jr. 20 Feb 62, 24p. incl. illus. table, 8 refs. (ASRDL technical rept. no. 2263)
Unclassified report

DESCRIPTORS: *Single crystals - Magnetic susceptibility, *Ferrites. Microwaves, Magnetic fields, Intensity, Crystal structure, Ferromagnetic materials, Frequency, Measurement.

Single crystal (ZnY) (Ba2Zn2Fe12022) was used in an investigation of the magnetic susceptibility as a function of RF magnetic field intensity. The large anisotropy field in these materials makes them attractive for application in microwave devices. High-power measurements were made in the frequency range 8.6- to 37.7-kMc. The microwave magnetic field in the cavities extended up to 35 oersteds. Measurements taken at a constant frequency indicate that there is an appreciable shift in the field required for resonance as a function of power. This shift in the resonance field is superimposed on the usual decline of the main resonance. Observed results indicate that the shift effect of the resonance field decreases as the linewidth and frequency are increased, and that the shift effect is also shape-dependent. In the frequency range 8.6- to 16.6-kMc, the critical field increases rapidly with frequency. Above this frequency range, the critical field remains fairly constant. At X-band frequencies, the critical field of unpolished ferroxplanar materials compares favorably with that of highly polished, single-crystal Yttrium-Iron-Garnet (YIG) materials. (Author)

AD-276 600 Div. 14, 25
(TISTM/BRW) OTS price $1.60

Arizona State U., Tempe.
OXIDE SEMICONDUCTOR MATERIALS AND DEVICE RESEARCH.
Quarterly progress rept. no. 1, 18 Jan-17 Mar 62 on Research to Investigate Electrical and Thermal Properties of Oxide Semiconductor Materials,
by J. Compton, F. English and others. 17 Mar 62, 16p. incl. illus.
(Contract DA 36-039-sc-89151)
Unclassified report

DESCRIPTORS: *Semiconductors - Materials, *Oxides - Electrical properties. Metallic compounds, Transition elements, Diodes, Titanium compounds, Preparation, Dioxides, Chemical impurities, Thermoelectricity.

A stockpile of material was prepared for use later in making sample diodes. This material consists entirely of dense uniform ceramic rutile. A study was made of the rectifying properties of diodes made with gold contacts as opposed to silver contacts. The rectifying contacts made with gold were found to be superior. The fabrication process for forming the oxide layers on rutile rectifying barriers was modified by reducing the temperature and extending the time of preparation. Preliminary results indicate that higher reverse breakdown voltages were obtained through this modification, but this advantage was offset by an increase in the forward resistance. Preparations have been made for measuring the admittance of rutile barriers. A sample holder with built-in coupling network for use with a Wayne-Kerr bridge has been constructed. An auxiliary network has been designed to apply dc bias to the diodes being tested. Measurements of the Seebeck coefficient of semiconducting polycrystalline rutile were made during the past period. The equipment is described and preliminary measurements are outlined. (Author)

AD-276 621 Div. 14, 17
(TISTM/BRW) OTS price $9.10

Army Chemical Research and Development Labs., Army Chemical Center, Md.
ELEVENTH MATERIALS REVIEW,
by Arthur Lyem. Apr 62, 107p. refs. (CRDL Special pub. no. 4-34)
(Proj. 4C93-30-001)
Unclassified report

DESCRIPTORS: *Materials - Scientific research, *Polymers - Polymerization, *Plastics - Processing, *Synthetic fibers, *Organic materials, *Metals - Physical properties, *Inorganic substances, *Bibliography - Materials. Ceramic materials, Metalorganic compounds, Production, Synthesis, Alloys, Laminates, Manufacturing methods, Coatings, Radiation effects, Semiconductors, Metallurgy, Fibers.

The literature survey culminating in this review provides selected information concerning recent worldwide technological advances that are presented under the following five major headings: high polymers, plastic materials, synthetic fibers, miscellaneous organic and inorganic materials, and metals. Over 350 articles have been abstracted from various publications and languages. Materials and technological aspects are discussed briefly, and a complete bibliography is given. (Author)

AD-276 656 Div. 14, 26
(TISTM/BRW) OTS price $1.60

Narmco Industries Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 13, 1-31 May 62,
by W. H. Otto, S. Dharmarajan, and C. Y. Chia. May 62, 14p. incl. illus. tables, 5 refs.
(Contract NOw 61-0623-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Filament wound construction. Reinforcing materials, Composite materials, Mechanical properties, Moisture-proofing, Epoxy resins, Amines, Anhydrides, Resins, Laminates, Failure (Mechanics), Plastics.

Using the criterion of single fiber tensile strength, a comparison is made of resin coatings applied during and after fiber forming. A comparison of an anhydride and an amine hardener is also made for the two methods of resin application. The effect on single fiber tensile strength of curing times up to 18 hr at 350 F is made using both the amine and anhydride hardeners. A literature survey of analytical work on anisotropic plates and filament reinforced structures is reported. It is shown that none of the existing theories is applicable to the present problem of extension and bending of layered plates with layers oriented in different directions. (Author)

AD-276 666 Div. 14, 26
(TISTM/EJH) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
A COMPARISON OF THREE CHLOROSILANE FINISHES FOR GLASS FABRIC USED IN REINFORCED PLASTICS,
by P. W. Erickson and Robert Middlebrook.
27 Mar 62, 19p. incl. illus. table (Rept. no. NOLTR 62-23)
Unclassified report

DESCRIPTORS: *Laminates - Bonding, *Composite materials, *Glass textiles - Mechanical properties, *Finishes, *Organic coatings, *Silicon coatings. Epoxy resins, Phenolic resins, Polymers, Esters, Allyl radicals, Chlorides, Silanes, Tensile properties, Test methods, Tests.

Experiments were designed to develop evidence for or against the theory that appropriate chemical functional groups in finishes constitute reactive sites for chemical bonding between a laminating resin and the finish during cure. Data show that it is possible, on the basis of the theory, to design ineffective as well as effective finishes. The strengths from laminates made with NOL-24 finished glass fabric were 64 to 600% greater than those from laminates made with dimethyldichlorosilane. These data cited, as well as other outside data, constitute evidence of an indirect nature favoring the theory. The tensile strength of heat cleaned fabric in the warp direction was raised from 260 lb/57 yarns to 370 lb/57 yarns by the NOL-24 treatment. A new Preferential Adsorption Theory is proposed which can serve to explain how a finish functions at the glass resin interface. (Author)

AD-276 709 Div. 14, 17, 25, 30
(TISTM/BRW) OTS price $3.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A REVIEW OF THE AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for 1 July 60-30 June 61,
by Junie J. Banks and Donna J. Tate. Mar 62, 204p. incl. illus.
(WADC TR 53-373, Suppl. 8)
Unclassified report

DESCRIPTORS: *Materials - Air Force research, *Bibliography - Materials. Ceramic materials, Cermets, Graphite, Metallurgy, Metals, Alloys, Joints, Non-destructive testing, Ceramic coatings, Organic coatings, Polymers, Elastomers, Composite materials, Adhesives, Plastics, Fibers, Fuels, Lubricants, Hydraulic fluids, Acoustic insulation, Electronics, Chemistry, Electricity, Thermodynamics, Nuclear physics.

These reports cover basic and applied research in the materials area being conducted by the Metals and Ceramics, Nonmetallic Materials, Physics, Manufacturing Technology and Applications Laboratories of the Directorate of Materials and Processes. (Author)

AD-276 865 Div. 14
(TISTM/TCG) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
RUBBER ELASTICITY IN HIGHLY CROSSLINKED POLYESTERS,
by Dov Katz and Arthur V. Tobolsky. 15 May 62, 10p. illus. tables, 5 refs. (ONR Technical rept. no. RLT-46)
(Contract Nonr-185807, Proj. 356-377)
Unclassified report

DESCRIPTORS: Polymers - Copolymerization, Esters. Rubber, Viscosity, Elasticity, Polymerization, Transition temperature, Styrenes, Propenes, Glycols, Anhydrides, Phthalic acids, Molecular structure, Molecules, Theory, Mechanical properties.

Three well-defined unsaturated polyesters were crosslinked with different amounts of styrene, and the 10-sec Gehman modulus was measured as a function of temperature. The equation for the shear modulus from the theory of rubber elasticity was applied for the plateau regions of the polymers and the front factors were calculated. The concepts of the theory of rubber elasticity are applicable to one system, namely P sub II/styrene; (propylene glycol-maleic anhydride-phthalic anhydride, ratio 2-1-1) this was the only completely compatible system. Simple equations for calculation of network chain lengths were suggested and from equations that take into consideration the molecular structure of resin networks, the front factors were obtained. The agreement between the calculated values for front factors and those from experiments was good in the P sub II/styrene system. (Author)

AD-276 867 Div. 14, 12
(TISTA/GEC) OTS price $11.00

Dielectrics Lab., Johns Hopkins U., Baltimore, Md.
DIELECTRICS FOR SATELLITES AND SPACE VEHICLES.
Final rept., 1 Mar 59-28 Feb 62,
by Louis J. Frisco. 30 Mar 62, 144p. incl. illus. tables, 34 refs. (Rept. no. 3)
(Contract DA 36-039-sc-78321, Proj. 3A-99-15-001)
Unclassified report

DESCRIPTORS: *Dielectrics - Electric insulation, *Space environmental conditions - Simulation. Electric properties, Dielectric properties, X rays, Ultraviolet radiation, Conductivity, Absorption, Polarization, Materials, Tests, Test methods, Materials, Resins, Plastics, Dielectric films, Laminates, Glass textiles, Ceramic materials, Tables, Satellite vehicles, Spaceships.

Results of a study of the effects of simulated space environment on the electrical properties of solid insulating materials are reported. Equipment and techniques are described for the measurement of loss properties, flashover strength and electric strength during x-ray and UV irradiation at pressures in the 10 to the -6th power Torr range. Twenty-one organic and inorganic materials are included. High-vacuum sparkover

(uniform field) and flashover measurements at d-c and 60 cps show that electrode surface roughness is the controlling factor; that the dielectric properties of the material do not influence flashover voltage; and that x-ray and UV radiation have no effect on flashover voltage. Electric strengths of low-loss polymers are not effected by x-ray irradiation in high-vacuum. X-ray induced a-c losses are exhibited by several materials during and after irradiation. X-ray induced d-c polarization, absorption and conduction currents are exhibited by most materials. (Author)

AD-276 868 Div. 14, 4, 8
(TISTM/BRW) OTS price $1.60

ITT Federal Labs., Nutley, N. J.
DEVELOPMENT OF MANUFACTURING PROCESS FOR HIGH PURITY ELECTRONIC CERAMICS.
Interim technical progress rept., 1 Mar-31 May 62 on Phase 2,
by J. H. Battle, A. J. Marino, Jr., and E. W. Currier. June 62, 11p. incl. illus.
(Contract AF 33(600)42473, Proj. 7-772)
(ASD TR 7-772, vol. 5) Unclassified report

DESCRIPTORS: *Ceramic materials - Manufacturing methods, *Barium compounds. Ferroelectric materials, Piezoelectric materials, Titanates, Zirconates, Niobates, Tantalum compounds, Production, Industrial equipment, Chemical analysis, X-ray diffraction analysis, Crystal structure, Synthesis.

The purpose of this project is to develop new or improved manufacturing methods for large scale production of ferroelectric or piezoelectric ceramic materials such as titanates, zirconates, niobates, and tantalates. A major requirement is high purity (99.95%). The accomplishments include the installation of pilot plant equipment, initial start-up procedures and chemicals for reaction, chemical analysis and x-ray techniques, and the investigation of a compatible barium zirconate technique. The synthesis of $BaTiO_3$ in the pilot plant will be accomplished by the addition of triethanolamine titanate to a potassium hydroxide/barium chloride solution. Chelated esters of zirconium compounds are under investigation. (Author)

AD-276 966 Div. 14
(TISTM/BRW) OTS price $2.60

Watertown Arsenal Labs., Mass.
THE SPECTRAL EMISSIVITY AND TOTAL NORMAL EMISSIVITY OF COMMERCIAL GRAPHITES AT ELEVATED TEMPERATURES.
Rept. on Materials for Solid Propellant Rocket Motors,
by Albert F. Grenis and Albert P. Levitt. May 62, 23p. incl. illus. 14 refs. (Technical rept. no. WAL TR 851.2/1)
Unclassified report

DESCRIPTORS: *Graphite. Thermal radiation, Electromagnetic waves, Atomic spectrum, Blackbody radiation, High temperature research, Surfaces, Nuclear power plants, Structures, Guided missiles, Rocket propulsion, Measurement, Temperature, Radiation instruments, Pyrometers, Optical instruments, Surface properties, Determination.

The spectral emissivities, at an effective wavelength of 0.65 microns, and total normal emissivities, were determined for machined and polished surfaces of the graphites Great Lakes Carbon H1LM and H3LM, and Speer 7100. The spectral emissivities were investigated within 1000 to 3000 C. For machined surfaces, the spectral emissivity decreased with increasing temperature from 0.87 to 0.81 for H1LM; from 0.87 to 0.83 for H3LM; and from 0.87 to 0.78 for Speer. For polished surfaces, the spectral emissivity remained constant with increasing temperature and the mean value was 0.855 for H1LM; 0.777 for H3LM; and 0.820 for Speer 7100. The total normal emissivities were investigated from 1600 to 3000 C. For machined surfaces, the mean value of the total normal emissivity was 0.852 for H1LM; 0.852 for H3LM; and 0.847 for Speer 7100. For polished surfaces, the mean value of the total normal emissivity was 0.802 for H1LM; 0.808 for H3LM; and 0.800 for Speer 7100. (Author)

AD-276 983 Div. 14
(TISTM/BRW) OTS price $2.60

Bell Aerosystems Co., Buffalo, N. Y.
THERMAL AND MECHANICAL TESTING OF FOAM ALUMINA AND FOAM ZIRCONIA,
by D. J. Powers. 29 June 62, 21p. incl. illus. tables (Rept. no. BLR 61-15(M) rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Foams, *Thermal insulation - Materials. Aluminum compounds, Zirconium compounds, Oxides, High temperature research, Thermal conductivity, Rupture, Deflection, Fracture (Mechanics), Failure (Mechanics), Test equipment, Ceramic materials, Mechanical properties.

A test program was conducted on alumina foam and zirconia foam to determine the possibility of using these materials as insulating panels for high temperature applications. The test temperatures in this program were limited to 3500 F. The mechanical properties determined were crushing strength at room temperature and modulus of rupture at room temperature, at 1500, and 2500 F. Thermal tests conducted were thermal conductivity and thermal exposure. The alumina foam had a nominal density of 37 lb/cu ft and the zirconia foam of 45 lb/cu ft. (Author)

AD-276 996 Div. 14, 25, 7
(TISTM/BRW) OTS price $4.60

Du Pont de Nemours, E. I., and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 2, 1 Oct-31 Dec 61,
by W. T. Hicks and J. T. Looby. 31 Jan 62, 41p. incl. illus. tables, 2 refs.
(Contract NObs-84824)
Unclassified report

DESCRIPTORS: *Selenides, *Tellurides, *Semiconductors - Electrical properties, *Thermoelectricity. Tantalum compounds, Tungsten compounds, High temperature research, Resistance, Hall effect, Electric power production, Generators, Preparation, Measurement, Thermocouples, Molybdenum compounds.

Seebeck coefficient, Hall effect and resistivity measurements were made on numerous compositions derived from the dichalcogenides $MoSe_2$, $MoTe_2$ and WSe_2. Crystallographic data and thermal conductivities were available from earlier work. The composition $W.99Ta.01Se_2$ shows the most practical promise of the systems investigated to date, with a Figure of Merit of 0.7 x 0.001/deg. It is planned to study more complex solid solutions next. Concurrent work on the construction of a simple thermoelectric generator for efficiency and life tests dealt with

encapsulation problems, which were partially solved by the use of chemically-setting Sauereisen cements. (Author)

15. MATHEMATICS

AD-276 519 Div. 15, 30
(TISTP/DAW) OTS price $3.60

System Development Corp., Santa Monica, Calif.
MATHEMATICAL PROGRAMMING, MAN-COMPUTER SEARCH AND SYSTEM CONTROL,
by William Karush. 16 May 62, 33p. 16 refs.
(Rept. no. SP-828)
Unclassified report

DESCRIPTORS: *Operations research, *Cybernetics, *Programming, *Computers. Control systems, Tranformations (Mathematics).

This analysis falls into two main parts -- the first describes some current research work in mathematical programming and related fields; the second presents some general aspects of computer methods and applications which may influence the future work of researchers in mathematical methods of system optimization throughout the country. (Author)

AD-276 534 Div. 15
(TISTP/DAW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A COMPUTATIONAL PROCEDURE FOR OPTIMAL SYSTEM DESIGN AND UTILIZATION,
by R. Bellman, H. Kagiwada, and R. Kalaba.
June 62, 13p. incl. illus. table, 5 refs. (Memo. no. RM-3174-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Control systems - Design, *Partial differential equations. Tables, Combinatorial analysis, Calculus of variations, Analysis.

AD-276 536 Div. 15, 30
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SOME QUEUING PROBLEMS WITH BALKING AND RENEGING - I,
by C. J. Ancker, Jr. and A. V. Gafarian.
11 May 62, 24p. incl. illus. 9 refs. (Rept. no. SP-372/001/00)
Unclassified report

DESCRIPTORS: *Probability, *Mathematical logic. Computer logic, Time lag theory, Operations research.

AD-276 545 Div. 15
(TISTP/TL) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
NOTE ON THE QUADRATIC CONVERGENCE OF THE CYCLIC JACOBI PROCESS,
by J. H. Wilkinson. 1 June 62, 10p. 4 refs.
(Technical rept. no. 23)
(Contract Nonr-22537, Proj. NR-044-211)
Unclassified report

DESCRIPTORS: *Polynomials, *Matrix algebra. Trigonometry, Rotation, Transformations (Mathematics).

AD-276 633 Div. 15, 30
(TISTP/JW) OTS price $3.60

Operations Analysis Office, Air Force, Washington, D. C.
ALTERNATE PRIOR DISTRIBUTIONS IN STATISTICAL DECISION THEORY,
by John P. Mayberry. June 62, 32p. incl. tables, 3 refs. (Operations Analysis paper no. 11)
Unclassified report

Presented to the Institute of Mathematical Statistics at Chapel Hill, N. C., 11-13 Apr 1962.

DESCRIPTORS: *Operations research, *Statistical analysis. Statistical distributions, Distribution theory, Matrix algebra, Test methods.

To remove the apparent arbitrariness in choice of a single prior distribution for a decision-theory calculation, it is feasible to assume several alternate prior distributions, and assess the results of reasonable policies, under each of those prior distributions. The minimax-regret principle, slightly modified, permits us to make a reasonable decision in view of the spectrum of possibilities. (Author)

AD-276 664 Div. 15
(TISTP/JW) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
ON A MIXED BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES,
by A. K. Aziz and J. B. Diaz. 2 Apr 62, 44p. incl. table, 21 refs. (Rept. no. NOLTR 61-32; Mathematics Dept. rept. no. M-19)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Boundary layer. Functions, Mathematical logic.

AD-276 685 Div. 15
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
TWO-IMPULSE TRANSFER VERSUS A ONE-IMPULSE TRANSFER - ANALYTIC THEORY,
by R. Barrar. 1 Mar 62, 25p. incl. illus. 3 refs. (Rept. no. SP-698)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Mathematical logic. Transformations (Mathematics), Velocity, Ellipsoids.

A mathematical proof is presented that if two coplanar elliptical orbits with a common focus intersect for some orientations, the optimum one-impulse transfer between the two orbits is still inferior to the two-impulse Hohmann transfer. This result was conjectured by Ting (ARS Journ; Vol. 30:1013-1018, 1960), but the present paper presents the first mathematical proof. (Author)

AD-276 686 Div. 15
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
AN ANALYTIC PROOF THAT THE HOHMANN-TYPE TRANSFER IS THE TRUE MINIMUM TWO-IMPULSE TRANSFER,
by R. B. Barrar. 6 Mar 62, 25p. incl. illus. 6 refs. (Rept. no. SP-723)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Transformations (Mathematics). Velocity, Analysis, Mathematical logic, Celestial mechanics.

Although it is commonly assumed that the Hohmann transfer is the optimum two-impulse transfer, an analytic proof has never been given. Ting (Jnl. of Amer. Rock Soc, Vol. 30:1013-18, 1960) proved the conjecture for the ''nearly Hohmann-type'' orbit. An analytic proof of this conjecture in full generality is presented. (Author)

AD-276 717 Div. 15
(TISTP/WH) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ENUMERATION OF REGULAR TRUTH FUNCTIONS.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Mar 61, 1v. incl. tables (Rept. no. 6-90-62-16)
Unclassified report

DESCRIPTORS: *Functions, *Mathematical logic.

In a previous work, (Lockheed Missiles and Space Company, 6-90-61-26, Jan 1961) the classification problem of the linearly separable truth functions was reduced to the enumeration of some special kind of linearly separable truth functions called canonical truth functions. A canonical truth function F of n variables has an important property: if $x \in F$ and $y \leq x$ in the canonical partial order of Q^n, then $y \in F$. Any truth function F of n variables which has this property is called a regular truth function. Thus, every canonical truth function is regular. One of our intermediate objectives is to answer the question whether or not the converse of this result is true. In a previous work, (Lockheed Missiles and Space Company, LMSD-703024, July 1960) it has been shown that every regular truth function of dimension not greater than 5 is linearly separable and hence canonical. Therefore, one may expect that the answer to this question is probably affirmative. However, when the dimension increases, the complexity multiplies and counter examples may turn up. The present work, concerns the problem of counting the regular truth functions as a part of the classification problem. (Author)

AD-276 718 Div. 15
(TISTP/JW) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE SYNTHESIS PROBLEM OF LINEAR SEPARABILITY.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Sep 61, 1v. 6 refs. (Rept. no. 6-90-62-17)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Functions, *Mathematical logic. Matrix algebra, Linear programming.

The synthesis problem of linear separability for switching functions is to determine whether or not a given switching function is linearly separable, and to find a system of weights and threshold value in case the given switching function is linearly separable. In this report an effective general method for this problem is developed by means of the principle of bounding solutions in the theory of linear inequalities. Then, the results are applied to establish rigorously Willis' method as presented in a previous report. (Author)

AD-276 843 Div. 15
(TISTP/JW) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
RELATIONSHIP BETWEEN SYSTEM FAILURE RATE AND COMPONENT FAILURE RATES,
by James D. Esary and Frank Proschan. Apr 62, 10p. 7 refs. (Mathematical note no. 256; Document no. D1-82-0161)
Unclassified report

Also available from the author.

DESCRIPTORS: *Failure (Mechanics), *Reliability. Statistical analysis, Calculus of variations, Probability, Life expectancy.

AD-276 848 Div. 15, 2
(TISTP/TL) OTS price $2.60

Columbia U., New York.
SIMPLE SINGULARITIES OF MAPS,
by I. R. Porteous. 1962, 26p. 13 refs.
(Rept. no. CU-11-ONR-266(57)-M)
(Contract Nonr-26657)
Unclassified report

DESCRIPTORS: *Topology, *Maps. Polynomials, Algebraic geometry, Sequences, Differential equations, Integral equations, Vector analysis, Real variables, Complex variables, Matrix algebra, Determinants.

AD-276 864 Div. 15
(TISTP/TL) OTS price $3.60

Florida State U., Tallahassee.
TWO SEQUENTIAL TWO-SAMPLE GROUPED RANK TESTS WITH APPLICATIONS TO SCREENING EXPERIMENTS.
Technical rept. no. 3 on the Development of Statistical Methods for Quality Control and Surveillance Testing Subjective Testing and Quality Evaluation,
by Frank Wilcoxon, L. J. Rhodes, and Ralph A. Bradley. May 62, 33p. incl. tables, 11 refs.
(Contract Nonr-98808, Proj. NR 042-004)
Unclassified report

DESCRIPTORS: *Quality control, *Sequential analysis, *Probability, *Statistical tests, *Medical research. Biology, Animals, Errors, Analysis, Population, Statistical distributions, Statistical functions.

Two-sample grouped rank tests are develcped as the Configural Rank Test and the Rank-Sum Test. For both tests, observations are taken in groups of m X-observations and n Y-observations with the observations ranked within the groups. The sequential procedures relate to the usual decisions at the end of each group, namely to accept a null hypothesis, to accept an alternative hypothesis, or to take another group of observations. The implications of these hypotheses are discussed. The sequential methods are direct applications of Wald sequential analysis. The configural rank test depends on a probability-ratio statistic based on probabilities of the particular configuration of ordered observations obtained; the rank-sum test uses the within-group rank sum for the Y-sample and probability ratios based on the probabilities for the rank sums. (Author)

AD-276 875 Div. 15
(TISTP/TL) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SUCCESSIVE APPROXIMATION APPLIED TO THE SYNTHESIS OF LINEAR SEPARABILITY.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Jan 62, 1v. 8 refs. (Rept. no. 6-90-62-19)
Unclassified report

DESCRIPTORS: *Linear systems, *Functional analysis, *Equations. Synthesis, Relaxation time, Inequalities, Numbers, Sequences, Real variables, Special functions.

Two processes are described, which are closely similar, and which depend upon successive approximation using relaxation techniques. These methods are described, and an analytical algorithm for one of the procedures is given. (Author)

AD-276 876 Div. 15
(TISTP/JW) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
AN ELIMINATION PROCESS FOR THE WILLIS SYNTHESIS METHOD.
Technical rept. on Mathematics,
by Sze-Tsen Hu. Nov 61, 1v. 5 refs. (Rept. no. 6-90-62-18)
Unclassified report

DESCRIPTORS: *Linear systems, *Inequalities, *Functions. Fourier analysis, Matrix algebra, Integral transforms, Real variables, Numbers.

A procedure is presented for solving the system of linear inequalities which results from application of what is called the Willis method in determining whether a function is linearly separable, and, if so, the appropriate weights and threshold values. The procedure described uses successive elimination to solve the system of linear inequalities, and can be traced to a process proposed by Fourier. The fundamental notions involved are described and an example is given to illustrate various stages of the procedure. (Author)

AD-276 917 Div. 15, 18
(TISTP/JW) OTS price $5.60

Northeastern U., Boston, Mass.
OPTIMAL SYNTHESIS OF AIR DEFENSE SYSTEMS IN TERMS OF MARKOV MODELS,
by Frank Di Cesare. 21 May 62, 48p. incl. illus. tables, 15 refs. (Scientific rept. no. 9)
(Contract AF 19(604)4573, Proj. 5632)
(AFCRL 62-354) Unclassified report

DESCRIPTORS: *Statistical processes, *Operations research, *Interception probabilities. Costs, Neutralization, Detection, Battle damage, Aircraft defense systems.

A Markov model considering the possible states of an aggressor in an air defense system is presented. This model considers an air defense system as consisting of two basic operations; detection and neutralization. Two types of costs, construction and losses, are related by means of a total cost function. The criterion for optimization is the minimization of the total cost function with respect to the pertinent transition probabilities. Examples illustrating the synthesis for a basic system are given, using various cost functions and utilizing alternative techniques for optimization, i.e., factorial method, univariate method, and the method of steepest descent. The techniques and results of these preliminary investigations are evaluated and an example of the synthesis is illustrated, including those modifications shown to be necessary by the evaluation. The Markov model is extended to allow division of basic operations so as to form multiple lines of defense and an example illustrating the synthesis for a double-line system is given. (Author)

AD-276 990 Div. 15
(TISTP/TL) OTS price $1.60

Numerical Analysis Research, U. of Calif., Los Angeles.
STABILITY QUESTIONS FOR SOME NUMERICAL METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS,
by Germund G. Dahlquist. May 62, 16p. incl. tables, 8 refs.
(Contracts Nonr-23324 and DA 04-495-ORD-1630)
Unclassified report

DESCRIPTORS: *Stability, *Numerical analysis, *Integration, *Differential equations. Vector analysis, Matrix algebra, Errors, Polynomials, Difference equations, Operators (Mathematics), Taylor's series, Transformations (Mathematics).

AD-276 980 Div. 15
(TISTP/TL) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON SEVERAL ''DISTINCT'' HYPOTHESES,
by Theophilos Cacoullos. 24 May 62, 14p. incl. illus. tables, 3 refs. (Technical rept. no. 44)
(Contract Nonr-22521, Proj. NR-042-993)
Unclassified report

DESCRIPTORS: *Statistical tests, *Probability. Real variables, Vector analysis, Statistical distributions, Statistical functions.

16. MEDICAL SCIENCES

AD-276 513 Div. 16
(TISTB/AW) OTS price $5.60

Armed Forces-NRC Vision Committee, Washington, D. C.
VISUAL PROBLEMS OF SPACE TRAVEL,
ed. by James W. Miller. 1 Apr 62, 55p. refs.
Unclassified report

DESCRIPTORS: *Vision. Space flight, Space medicine, Weightlessness, Gravity, Stress (Physiology), Hazards, Radiation effects, Bibliography.

The problems of space flight as they relate to the visual mechanism are discussed. Substantial portions of the Brown report are quoted in the present report. This report, in addition to updating the Brown report, presents a considerable amount of additional information regarding specific critical visual problems, as well as a recently compiled, extensive bibliography of research in this field. (Author)

AD-276 619 Div. 16
(TISTB/MS) OTS price $1.60

Biological Labs., Frederick, Md.
APPARATUS AND METHOD FOR THE STEAM STERILIZATION OF FOOD FOR GERMFREE LABORATORY ANIMALS. AN INVESTIGATION OF THE PRACTICAL APPLICATION OF GNOTOBIOTIC TECHNOLOGY TO THE IMPROVEMENT OF BREEDING COLONIES,
by Richard B. Wescott and John A. Gardner.
June 62, 32p. incl. illus. table, 22 refs.
(Technical manuscript no. 7)
Unclassified report

DESCRIPTORS: *Laboratory equipment - Test methods, *Germ free animals - Sterilizers, *Test equipment - Design, *Food - Handling. Containers, Plastics, Steam, Laboratory animals.

The design and preliminary use of an apparatus and method for the steam sterilization of food for germfree animals are described. The need for such a system is shown by an examination of other existing methods. In addition, the general gnotobiotic techniques and equipment used in this colony are described and the purpose of maintaining such a colony is discussed. (Author)

AD-276 629 Div. 16
(TISTB/CCH) OTS price $9.10

Delaware U., Newark.
THE COMPARATIVE METABOLISM OF A NORMAL AND A PARALYZED MUTANT STRAIN OF CHLAMYDOMONAS,
by Vincent J. Cristofalo and R. R. Ronkin.
11 June 62, 102p. incl. illus. tables, 48 refs.
(Technical rept. no. 62-1)
(Contract Nonr-150600)
Unclassified report

DESCRIPTORS: *Algae - Metabolism. Mutations, Paralysis, Growth, Metabolic products, Plant pigments, Respiration, Motion, Metabolism inhibitors.

Metabolic characteristics of a normal and a paralyzed mutant strain of Chlamydomonas were compared. Growth rates were alike in both strains. The division of these strains of Chlamydomonas became synchronized under a regimen of alternating light and dark (12 hours each) Characteristics of the paralyzed mutant were identical with the wild type. Despite the sensitivity of the motility of this organism to reagents which inhibit aerobic respiration, the wild type organisms were found to swim for up to four hours after being placed in a chamber made anaerobic with alkaline pyrogallol. The data indicate that both strains of Chlamydomonas are virtually identical in these characteristics of growth, synchronization, excretion products and endogenous respiration. (Author)

AD-276 634 Div. 16
(TISTB/CCH) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
AN ASSOCIATIVE MACHINE FOR DEALING WITH THE VISUAL FIELD AND SOME OF ITS BIOLOGICAL IMPLICATIONS,
by Harry Blum. Feb 62, 27p. incl. illus.
7 refs. (AFCRL 62-62)
(Proj. 5632)
Unclassified report

Presented at the Second Annual Bionics Symposium, held at Cornell U., 31 Aug 61, at Ithaca, N. Y.

DESCRIPTORS: *Identification systems, *Visual perception. Analog computer, Neuromuscular transmission, Brain, Probability, Theory, Mathematical logic, Cybernetics.

The present state of the field dealing with the understanding and performing of mental activity is largely the outgrowth of the mathematical insights produced by a century or so of developments in formalistic logic and probability theory. Their success in dealing with certain aspects of mental activity, and the ability of the neuron to implement the required mathematics, has given a tremendous impetus to investigation in this field. Yet, our ability to understand and perform artificially the intuitive, associative and related processes has not passed beyond the elementary level. Therefore, the work described went back to the biological system to see whether alternative mechanisms could not be derived; mechanisms which would simulate these aspects of mental activity better than the classical methods. A specific mechanism for the processing of line visual data was derived. It has broad implications to the whole field of bionics. (Author)

AD-276 640 Div. 16
(TISTM/TCG) OTS price $7.60

Kettering Lab., U. of Cincinnati, Ohio.
TOXICITY OF BERYLLIUM.
Final technical engineering rept., June 58-Apr 62,
by J. Cholak, Robert A. Kehoe and others. Apr 62,
69p. incl. illus. 95 refs.
(Contract AF 33(600)37211)
(ASD TR 62-7-665) Unclassified report

DESCRIPTORS: *Beryllium, *Beryllium poisoning, *Toxicity. Industrial medicine, Control systems, Sampling, Chemical analysis, Colorimetric analysis, Spectrographic analysis, Ventilation, Medical examination, Bibliography.

This report includes descriptions of the effects of the absorption of Be and specific measures designed to prevent illness and maintain health among persons who work with Be. The report covers the history of Be disease, hygienic standards, environmental control procedures, sampling and analytical procedures, housekeeping, personal hygiene and plant sanitation, and a medical program. Illustrations of ventilation controls are included. (Author)

AD-276 719 Div. 16
(TISTB/AW) OTS price $6.60

Louvain U. (Belgium).
RESEARCH ON RESPONSE TO PAIN.
Final technical rept.,
by A. E. McKenna and J. Colle. 1 Nov 61, 1v. incl. illus. tables, 102 refs.
(Contract AF 61(514)1101)
(AFOSR-2831) Unclassified report

DESCRIPTORS: *Pain. Skin, Temperature, Measurement, Electroencephalography, Stress (Physiology), Respiration, Electrocardiography, Physiology, Stimulation, Psychology, Recording devices, Reaction (Psychology).

A modification on the Hardy-Wolff-Gooddell method of stimulation by thermal radiation was used. Thresholds of pain sensation were obtained in the usual manner but response was measured, not only by the judgment of subjects, but by the reactions in a group of physiological variables as well; these included EEG, EKG, PGR and change in respiration. Threshold values obtained in terms of skin temperatures at stimulus site after irradiation were higher (47.3 - 48.6 C) than those reported in most of the previous investigations. Plotting magnitude of responses against physical intensity of stimulus for pain and non-pain categories reveals that intensity and duration of reactions in pain is not mainly determined by physical intensity of stimulus but the determinant is presumably to be found in central factors within the subject himself. Implications of the findings for the pain experience in the true life situation are discussed. (Author)

AD-276 806 Div. 16, 14
(TISTB/CCH) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PHYSICO-CHEMICAL PROPERTIES OF THE OUTER SURFACE OF PROTEIN FIBERS IN RELATION TO THEIR GENERAL HYDROPHILIC CHARACTERISTICS (Fiziko-Khimicheskiye Svoistva Vnishnei Poverkhnosti Proteinovykh Volokon v Svyazi s Ikh Ob''emniy Gidrofil' 'nost'yu),
by V. A. Pchelin. 1961, 8p. incl. tables, 11 refs. (Trans. no. T-1619 from Kolloidnyi Zhurnal 2-3:241-248, 1938)
Unclassified report

DESCRIPTORS: *Proteins - Fibers, Wetting agents - Absorption. Cotton cellulose, Hair, Feathers, Chemical properties.

The surface and general hydrophilic characteristics of proteinic and cotton fibers were measured. The methods of selective wetting and of the non-dissolving volume were used. In the substances studied, a complete incongruity between the general and surface hydrophilic characteristics was found. Cases were discovered when the surface was hydrophobic while the substance was generally clearly hydrophilic (hair, feathers), and also cases were found when the surface was strongly hydrophilic while the substance was generally mildly hydrophilic (silk, cellulose fibers). The hydrophilic characteristics of the surface of fibrous substances give the most correct idea of their behavior during absorption processes. It is demonstrated that all methods of chemical treatment leading to an increase in the affinity of the surface of hair for water promote its more intense dyeing. Wettability measurements are a convenient method of controlling and studying such processes. (Author)

AD-276 834 Div. 16
(TISTB/AW) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
COLD INJURY AT THE CELLULAR LEVEL,
by S. F. Cook and Robert W. Belknap. Oct 61, 14p. incl. tables, 5 refs. (Rept. no. AAL TR 61-14)
(Proj. 8237; In cooperation with California U., Berkeley)
Unclassified report

DESCRIPTORS: *Hypothermia. Cells (Biology), Tissues (Biology), Nervous system, Liver, Kidney, Enzymes, Rats.

The effects of hypothermia on the tissues and cells were investigated. Hypothermia causes a significant increase in the metabolic rate of liver slices: it significantly depresses the metabolic rate of kidney cortex slices. There is strong evidence to suggest that the enzyme system responsible for moving pyruvate into the TCA cycle is potentiated. Increases in wet-dry ratios were seen in liver, kidney, and heart; however, they tended to be transitory. It is suggested that the ether-extractable lipid may be affected by hypothermia; this, however, was not statistically significant. Evidence of CNS damage was also noted; it may be a strain difference. (Author)

AD-276 857 Div. 16
(TISTB/AW) OTS price $4.60

General Dynamics/Electric Boat, Groton, Conn.
ENGINEERING RESEARCH ON A PHOTOSYNTHETIC GAS EXCHANGER. PART II. ENGINEERING CONSIDERATIONS,
by Allen E. Rabe and Richard J. Benoit.
7 May 62, 33p. illus. refs. (Rept. no. U413-62-023)
(Contract Nonr-339400)
Unclassified report

DESCRIPTORS: *Algae. Light, Illumination, Stirrers, Production, Growth, Photosynthesis, Design, Carbon dioxide.

The light intensity distribution existing in an algae culture, given the incident light intensity and cell concentration, is investigated. The effects of stirring are studied as a means for producing intermittent light patterns considered beneficial for efficient cell growth. (Author)

AD-276 927 Div. 16
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BIOELECTRIC CONTROL SYSTEMS,
by A. Kobrinskiy. 6 Mar 62, 10p. incl. illus. (Trans. no. FTD-TT-62-36 of Radio 11:pp 37-39, 1960)
Unclassified report

DESCRIPTORS: *Biophysics - USSR, *Prosthetics - Electrical equipment, *Medical equipment - Control systems. Medical research, Reflexes, Muscles, Brain, Human engineering, Arms.

AD-276 988 Div. 16, 12
(TISTA/SEB) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
SAFETY OF PERSONNEL DURING AN IM-99B MISSILE LAUNCHING,
by Sherrill G. Laney. June 62, 17p. incl. illus. tables, 7 refs. (APGC TDR 62-38)
Unclassified report

DESCRIPTORS: *Guided missiles - Launching, *Launching sites - Hazards, *Guided missile personnel - Hazards. Safety, Exhaust gases, Toxicity, Rocket motor noise, Noise, Temperature, Ears, Surface to air, Physiology, Stress (Physiology).

The relative safety of personnel in several selected areas was studied during an IM-99B launching. Data were collected relative to free-air temperature, noise, and toxic gases which contribute to personnel hazards. Based on an analysis of the data obtained by physical measurements, survivability of personnel remaining at the selected test locations in the launch area during missile launch would be 100%. However, they may experience both temporary and permanent ear damage. (Author)

17. METALLURGY

AD-276 547 Div. 17, 25
(TISTM/BRW) OTS price $11.50

Stanford U., Calif.
THE EFFECT OF LONG-RANGE ORDER ON THE ELASTIC AND PLASTIC PROPERTIES OF ALLOYS AT ELEVATED TEMPERATURES.
Doctoral thesis,
by John A. Hren. 15 Feb 62, 137p. incl. illus. 100 refs. (DMS rept. no. 62-2)
Unclassified report

DESCRIPTORS: *Alloys - Crystal structure. Phase transitions, Grains (Metallurgy), Mechanical properties, Elasticity, Plasticity, Stresses, Deformation, Internal friction, Creep, High temperature research, Transformations, Metals, Copper alloys, Zinc alloys, Brass, Cobalt alloys, Iron alloys, Aluminum alloys, Theses.

The dynamic elastic modulus of alloys near stoichiometric CuZn, FeCo and Fe3Al was measured using transverse vibration of unrestrained cylindrical specimens. Test frequencies were in the range 700 to 3000 c. Internal friction measurements were made concomitantly using both the free-decay and half-width methods. Measurements on CuZn were in vacuo using a novel radiation heating furnace. Experiments on FeCo and Fe3Al were in air with an applied magnetic field of 1500 oersteds to eliminate magnetic damping phenomena. Creep studies on CuZn were conducted in compression and on FeCo in torsion. (Author)

AD-276 555 Div. 17, 26
(TISTM/BRW) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
PILOT EVALUATION OF VANADIUM ALLOYS.
Bimonthly rept. no. 4, 18 Mar-17 May 62,
by B. R. Rajala. 15 June 62, 13p. incl. tables. (Rept. no. ARF 2231-4)
(Contract NOw 62-0101-c)
Unclassified report

DESCRIPTORS: *Vanadium alloys. Niobium alloys, Titanium alloys, Sheets, Tensile properties, Mechanical properties, Processing, Oxygen, Nitrogen, High temperature research, Tests, Molybdenum alloys, Tantalum alloys, Tungsten alloys, Preparation, Carbon, Zirconium alloys.

High-vanadium and V-60 wt-% Nb base alloys containing refractory metal and interstitial additions were fabricated by hot and cold rolling techniques. All compositions were rendered to 0.050-in. sheet except those containing Mo or more than 0.13 wt-% combined O and N. Tensile results at 2400 F showed that V-20 wt-% Nb base materials had ultimate tensile strength values in the 8,000 to 10,000 psi range, whereas V-60 wt-% Nb base alloys had strengths of 12,000 to 19,000 psi. Additions of 0.05 wt-% O or 0.03 wt-% each of O and N produced large strength increases in the V-60 wt-% Nb base. A 100-lb ingot of V-1Ti-60 Nb was melted by Oregon Metallurgical Corporation and shipped to E. I. du Pont for extrusion and subsequent fabrication into bar, plate, and sheet for more detailed property evaluations. (Author)

AD-276 620 Div. 17
(TISTM/BRW) OTS price $1.50

Armor Research Foundation, Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Final rept., 3 Apr 61-2 May 62,
by T. J. Koppenaal and N. M. Parikh. 9 May 62, 42p. incl. illus. tables, 4 refs. (Rept. no. ARF 2221-6)
(Contract NOw 61-0555-c)
Unclassified report

DESCRIPTORS: *Composite materials, *Metals - Mechanical properties, *Reinforcing materials. Alloys, Metallic textiles, Fibers, Deformation, Plasticity, Hardening, Aluminium, Tungsten, Tungsten wire, Silver, Stainless steel, Wire, Aluminum alloys, Copper alloys, Nickel alloys, Graphite, Stresses, Microstructure, Tensile properties, Grains (Metallurgy), Molybdenum wire, Molybdenum.

A fundamental investigation into the deformation mechanism of composite materials by microstraining and slip line observations showed that plastic deformation starts in the weaker matrix and that fibers strengthen the composites by decreasing the available slip length in the matrix. Hence, the main effect of fibers is to increase the rate of work hardening which leads to a higher yield stress. The mechanical properties of several different composites made from fibers of 0.0002 to 0.001 in. in diameter were investigated. Best results were obtained with an aluminum matrix strengthened with 1-mil diameter tungsten fibers; the yield strength nearly tripled with the addition of only 12 volume (50 weight) per cent fibers. Young's modulus also increased with the amount of fibers added. Another attractive set of composites was found with a silver matrix reinforced with type 430 stainless steel fibers, 1 mil in diameter. Attempts were made to reinforce an aluminum, an Al-4% Cu alloy, and a 50% Cu-50% Ni alloy matrix with 0.0002 in. diameter graphite fibers, but the graphite was found to be a relatively poor reinforcing material. (Author)

AD-276 644 Div. 17, 27
(TISTM/BRW) OTS price $5.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
STRESS CORROSION OF HIGH STRENGTH STEELS AND ALLOYS; ARTIFICIAL ENVIRONMENT.
Quarterly scientific progress rept. no. 16,
1 Feb-30 Apr 62,
by C. J. Owen and J. Jaskowski. 30 Apr 62, 51p. incl. tables (Rept. no. 16)
(Contract DA 36-034-ORD-3277)
Unclassified report

DESCRIPTORS: *Corrosion research, *Rocket cases, *Steel - Corrosion. Stresses, Sheets, Alloys, Stainless steel, Titanium alloys, Cobalt alloys, Heat treatment, Mechanical properties, Corrosion inhibition, Failure (Mechanics), Tests.

A brief review of the experimental procedures utilized in the stress corrosion testing program is presented. Three strength levels of Vascojet-1000 and two strength levels of D6Ac U-bend samples were subjected to stress corrosion testing in five synthetic environments. The V-1000 data indicate that the alloy is the more susceptible of all groups tested to date. No minimum strength level of inhibition is indicated by the data for this alloy. Failure during testing of the V-1000 samples was often of the multiple-crack catastrophic type rather than of the single-crack type. The D6Ac data indicate that, of the low alloy, high strength steels tested to date, this material is the least susceptible to stress corrosion failure. Data for stress corrosion testing of comparative heats of V-1000 and D6Ac substantiate the order of magnitude of failure observed for the foregoing. Tables of cumulative stress corrosion test data for other alloys being tested by both the U-bend and bent beam test methods are presented for comparative reference. (Author)

AD-276 651 Div. 17, 20
(TISTP/JW) OTS price $4.60

General Electric Co., Schenectady, N. Y.
RESEARCH DIRECTED TOWARD THE STUDY OF THE RADIATION DAMAGE THRESHOLDS OF THE ELEMENTS,
by P. G. Lucasson and R. M. Walker. June 62, 45p. incl. illus. 30 refs. (Scientific rept. no. 5)
(Contract AF 19(604)5557)
(AFCRL 62-134) Unclassified report

DESCRIPTORS: *Metallurgical analysis, *Resistance, *Electron bombardment. Aluminum, Silver, Gold, Copper, Iron, Molybdenum, Nickel, Tungsten, Zinc, Titanium, Radiation effects, Radiation damage.

The changes in residual electrical resistance produced by bombardment with high energy electrons were measured for a number of metals as a function of electron energy in the range from 0.5 to 1.5 Mev. The irradiations were performed at 20 K and lower and recovery measurements were made up to 300 K. The production curves were analyzed using simple displacement theory and the following values were found for the average threshold energies: Al--32 ev; Au--greater than 40 ev; Ag--28 ev; Cu--22 ev; Fe--24 ev; Mo--37 ev; Ni--24 ev; Ti--29 ev; and W greater than 35 ev. Approximate values for the resistivities of Frenkel pairs (in units of microhms cm per atomic per cent) were also obtained as follows: Al--3.4; Ag--1.4; Cu--1.3; Fe--12.5; Mo--4.5; Ni--3.2, and Ti--42. In the case of Al it was necessary to take secondary defect production into account; and a number of representative theoretical curves, based on different assumptions concerning the process of secondary defect production, are included. The behavior of Zn was anomalous in that the added resistivity was not a linear function of electron dose at 20 K. (Author)

AD-276 652 Div. 17, 20
(TISTP/JW) OTS price $1.60

General Electric Co., Schenectady, N. Y.
RESEARCH DIRECTED TOWARD THE STUDY OF THE RADIATION DAMAGE THRESHOLDS OF THE ELEMENTS,
by P. G. Lucasson and R. M. Walker. June 62, 16p. incl. illus. tables, 21 refs. (Scientific rept. no. 6)
(Contract AF 19(604)5557, Proj. 5620)
(AFCRL 62-199) Unclassified report

DESCRIPTORS: *Electron bombardment, *Metallurgical analysis, *Resistance. Temperature coefficient of reactivity, Radiation effects, Energy, Copper, Zinc, Radiation damage.

Electron damage measurements previously have been used to obtain values for the average threshold energies and for the electrical resistivities of Frenkel pairs in a number of metals. In the report it is shown that there is an empirical correlation between the point defect resistivities so obtained and the normal, high-temperature electrical resistivities of different metals. The threshold energies are discussed and extrapolations are made to predict values for certain metals whose threshold energies have not yet been measured. The low temperature (Stage I) recovery of most of the metals studied is shown to be qualitatively similar to that in copper, and the correlation of recovery temperatures with certain bulk properties is discussed. The radiation damage parameters derived from the electron results are used to compare theory and experiment for irradiations performed with heavy particles. It is shown for neutron irradiations that there is a general tendency for the simple displacement theory to give better agreement with experiment as the atomic weight of the bombarded material increases. (Author)

AD-276 693 Div. 17
(TISTM/BRW) OTS price $16.00

Watertown Arsenal Labs., Mass.
HISTORICAL MONOGRAPH. THE ORDNANCE CORPS TITANIUM PROGRAM 1946-1961,
ed. by John J. Burke. Feb 62, 251p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Titanium - Processing, *Titanium alloys - Machining. Mechanical properties, Heat treatment, Melting, Casting, Machining, Welding, Brazing, Surface properties, Coatings, Chemical analysis, Metallurgical analysis, Armor plate, Metal joints, Metal plates, Sheets, Extrusion, Specifications, Bibliography, Castings, Military research.

Contents:
Historical background
Arc melting and casting
Alloy development and heat treating
Mechanical properties
Fabrication
Joining
Machining and grinding
Surface treatment
Chemical analysis
Metallography
Armor
Applications
Specifications
Contracts
Bibliography

AD-276 694 Div. 17
(TISTM/BRW) OTS price $1.60

Watervliet Arsenal, N. Y.
STRAIN HARDENING OF ORDERED Cu_3Au ALLOY,
by M. J. Hordon. Apr 62, 17p. incl. illus. 10 refs. (Technical rept. no. WVT-RR-6209)
(DA Proj. 50305025)
Unclassified report

Division 17 - METALLURGY

DESCRIPTORS: *Gold alloys, *Copper alloys. Deformation, Hardening, Transformations, Phase transitions, Crystal structure, Lattices, Stresses, Tensile properties, Electrical properties, Resistance, Measurement, Plasticity, Plastic flow, Metallurgy.

Measurements of the 0.001 yield stress of ordered and disordered polycrystalline Cu_3Au were related to the antiphase domain size determined by resistivity measurements. For undeformed material, a yield stress maximum was obtained at a critical domain size of about 40 Angstroms. Plastic deformation resulted in a marked increase in the plastic flow stress of the ordered alloy compared to the disordered, the strain hardening rate increasing regularly with initial antiphase domain size. Order hardening was accompanied by a sharp reduction in size of the initially large domains. (Author)

AD-276 716 Div. 17
(TISTB/AW) OTS price $10.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
BERYLLIUM: A SURVEY OF THE LITERATURE, AUGUST-DECEMBER 1961,
comp. by Jack B. Goldmann. Mar 62, 134p.
(Special bibliography no. SB-61-35, suppl. 2; Rept. no. 3-80-62-2, suppl. 2)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: *Bibliography - Beryllium, *Beryllium, *Metallurgy, *Beryllium compounds. Manufacturing methods, Processing, Production, Physical properties, Casting, Castings, Alloys.

AD-276 735 Div. 17, 25
(TISTM/BRW) OTS price $9.60

Harvard U. Div. of Engineering and Applied Physics, Cambridge, Mass.
THE FRACTURE OF METALS UNDER IMPULSIVE LOADING CONDITIONS,
by John L. O'Brien. 20 Dec 61, 78p. incl. illus. tables, 37 refs.
(Contract Nonr-186635, Proj. NR-031-486)
Unclassified report

DESCRIPTORS: *Metals - Fracture (Mechanics). Impact shock, Compression shock, Shock waves, Stresses, Explosions, Detonation waves, Aluminum, Aluminum alloys, Copper, Copper alloys, Lead, Nickel, Silver, Tensile properties.

A modification of the Hopkinson pressure-bar technique (Scientific Papers, Cambridge University Press, New York, 1921) was used to study the spalling of metals impacted with a compression shock-wave. The wave was generated by an explosive in contact with a metal block, and a rarefaction wave was produced upon reflection of the incident wave from the free-surface of the block. The spatial distribution of pressure behind the wave front was determined by the measurement of the velocities of pellets inserted in the block. From this pressure distribution and the measured fracture distance, the tension stress at fracture was determined for 5 face-centered cubic metals: Al, Cu, Ag, Ni, and Pb. The fracture stresses of 2 high-strength alloys of Al and Cu were also determined. The modifications of the Hopkinson experiment involved the use of a front pellet, ahead of the fracture pellet, to remove the unknown front of the wave, as well as a variation in the depth of this pellet to vary the time of application of the fracture stress. From the latter technique, it was found that the fracture began by the growth of cracks, and final failure occurred by the shear of metal separating crack tips. (Author)

AD-276 871 Div. 17, 25
(TISTB/LH) OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMOMAGNETIC AND GALVANOMAGNETIC PROPERTIES OF SEMICONDUCTORS AND SEMIMETALS: AN ANNOTATED BIBLIOGRAPHY,
comp. by George E. Owens. Mar 62, 107p. (Special bibliography no. SB-62-1; 2-98-62-2)
(Contract AF 33(616)8490)
Unclassified report

DESCRIPTORS: *Bibliography - Semiconductors. Thermal conductivity, Thermoelectricity, Magnetic properties, Electromagnetic properties, Measurement.

This bibliography results from a search for data on the thermomagnetic and galvanomagnetic properties, at temperatures up to 300 K, of semiconductors and semimetals. The arrangement of the 246 references is alphabetical by author, or by title if author is lacking. Two indexes are appended: the research reports by issuing agency (corporate author), and the journal articles by journal title and year of publication. Sources utilized include the following: LMSC Technical Information Center card catalogs; Applied Science and Technology Index, January - November 1961; ASTIA Technical Abstract Bulletin, 1961; Electrical Engineering Abstracts, 1960 - October 1961; Engineering Index, 1960; I.R.E. Proceedings, July - November 1961; Nuclear Science Abstracts, November 1960 - October 1961; Physics Abstracts, 1960 - October 1961; Solid State Abstracts, v. 1 - v. 2 no. 2; Solid State Electronics, v. 1 - v. 3 no. 2; and Technical Translations, July 1959 - October 1961. (Author)

AD-276 901 Div. 17, 25
(TISTM/BRW) OTS price $3.60

Manufacturing Labs., Inc., Cambridge, Mass.
DISLOCATIONS AND PLASTIC BEHAVIOR OF IRON SINGLE CRYSTALS.
Rept. for 1 Feb 60-31 Jan 61, on Solid State Research and Properties of Matter,
by Paul J. Fopiano. Apr 61, 27p. incl. illus. tables, 5 refs.
(Contract AF 33(616)6348, Proj. 7021)
(WADD TR 61-145) Unclassified report

DESCRIPTORS: *Single crystals - Growth, *Iron. Metallurgy, Crystal structure, Lattices, Deformation, Heat treatment, Tensile properties, Plasticity, Elasticity, Stresses, Crystallization, Spectrographic analysis, Metallurgical analysis, Grains (Metallurgy).

Studies were made of the development of suitable techniques and apparatus for the strain-anneal growth of Fe single crystals. The metallography and etch pitting of annealed and strained single crystal specimens were developed and shown to give consistent results. While x-ray and light micrographs of extra-large grained specimens showed qualitative agreement, the technique was not felt to be sufficiently quantitative. The double crystal spectrometer is of most interest. The desirability of being able to follow the effect of strain on the rocking curve of one particular area of an Fe single crystal has led to the construction of a tensile apparatus capable of being mounted directly on the double crystal spectrometer. The methods and results of employing this technique are discussed. The analysis of these results based on a dislocation model is presented. (Author)

AD-276 902 Div. 17, 25
(TISTM/BRW) OTS price $1.10

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
METALLURGICAL ASPECTS OF FRACTURE AT HIGH STRENGTH LEVEL.
Quarterly rept. no. 3, 1 Jan-1 Apr 62,
by W. A. Backofen and M. L. Ebner. 1 Apr 62, 5p. illus. table.
(Contract DA 19-020-ORD-5235, Proj. 5B-32-004)
(WAL TR 310.24/5-3) Unclassified report

DESCRIPTORS: *Fracture (Mechanics). Alloys, Metals, Steel, Sheets, Mechanical properties, Austenite, Heat treatment, Phase transitions, Grains (Metallurgy), Microstructure, Temperature, Cooling, Deformation, Plasticity, Tensile properties, Metallurgical analysis, Hardness, Rocket cases.

Study of the effect of various austenitizing treatments on plane-strain fracture toughness (K sub IC) of AISI 4340 continued. As reported previously, K sub IC passed through a maximum as austenitizing temperature was increased. Typical fractures are illustrated. For the particular quantity of AISI 4340 tested, austenitizing above about 2050 F did not produce further increase in K sub IC; rather, fracture followed prior austenite grain boundaries, and extensive slow crack growth occurred at mean stresses as low as 50% of the net fracture stress so that the average value of K sub IC began to decrease and the scatter in K sub IC increased greatly. Behavior associated with the higher austenitizing temperatures is related to overheating, which continues to be an ill-understood problem in many forging operations. The actural overheating temperature varies among heats of AISI 4340, generally falling between 2100 and 2300 F. (Author)

AD-276 914 Div. 17
(TISTM/TCG) OTS price $1.60

New York U. Coll. of Engineering, N. Y.
ON THE RESIDUAL TENSILE STRENGTH OF CRACKED STRUCTURAL ELEMENTS,
by George Gerard. 28 May 62, 16p. incl. illus. table, 7 refs. (Technical rept. no. SM 62-7)
(Contract NOw 62-0176-d)
Unclassified report

DESCRIPTORS: *Structures, *Fracture (Mechanics). Tensile properties, Stresses, Elasticity, Plasticity, Mechanical properties, Tests, Data, Alloys, Aluminum alloys, Steel, Theory.

A modified stress concentration factor approach is presented for determining the residual strength of structural elements containing cracks of limited extent. The ductility ratio which characterizes the material in the presence of a stress concentration and the effective radius of the crack are evaluated as a single material parameter from the test data correlation scheme presented herein. Test data for Al alloys and steel were analyzed. (Author)

AD-276 982 Div. 17, 26
(TISTM/BRW) OTS price $8.10

Bell Aerosystems Co., Buffalo, N. Y.
INVESTIGATION OF ALUMINUM ALLOY 6061 T4-T6 WELDED AND UNWELDED,
by E. J. King. 29 Dec 61, rev. 29 June 62, 71p. incl. illus. tables (Rept. no. BLR 61-40 (M) rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Aluminum alloys - Mechanical properties. Welded joints, Low temperature research, Aging, Tensile properties, Physical properties, Stresses, Deformation, Arc welding, Test equipment, Heat treatment, Design, Data, Low temperature alloys, Magnesium alloys, Silicon alloys.

Aluminum alloy 6061 was studied from practical welding considerations. Effort was made to duplicate in-shop welding and heat treatment conditions. Areas of concern to the design and metallurgical engineering departments in regard to tank fabrication, including mismatch due to improper line up of various degrees (25, 50 and 100%), effect of weld repairs, hand versus machine, effect of aging, and the effect of low temperatures on the mechanical properties of welded and unwelded, notched and unnotched, solution treated and solution treated and aged material, were studied. Mismatch is encountered in hardware fabrication as the result of poor line up or warpage of one piece of material in respect to another prior to welding. The designer is in need of this information to arrive at sound engineering safety factors. (Author)

AD-276 985 Div. 17
(TISTM/BRW) OTS price $2.60

Bell Aerosystems Co., Buffalo, N. Y.
CRYOGENIC PROPERTIES OF 2014T6 AND A-286. PHASE II,
by E. J. King. 29 June 62, 18p. incl. illus. tables, 2 refs. (Rept. no. BLR 61-35(M) rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Steel - Mechanical properties, *Aluminum alloys - Cryogenics. Copper alloys, Magnesium alloys, Silicon alloys, Rods, Tensile properties, Stresses, Deformation, Low temperature research, Low temperature alloys, Heat resistant alloys, Corrosion resistant alloys, Aging, Dispersion hardening, Hardness, Data, Alloys.

Tensile properties of A-286 and 2014T6 were obtained at room temperature, at -110 F (methylene chloride and dry ice), and at -320 F (liquid N). A-286 is a corrosion and heat resistant austenitic alloy. It develops optimum properties by means of a solution heat treatment followed by a precipitation or aging treatment. In the solution heat treated condition the alloy is extremely soft and ductile and may be cold drawn and formed very readily. The Al alloy 2014T6 is a high strength alloy and is of the Al-Cu-Mg-Si type employing CuAl2 as the primary precipitation-hardening agent. A secondary precipitation hardener, CuMg5-Si4Al4, greatly increases the strengths obtainable through artificial aging and is also responsible for the natural aging characteristics of this alloy. Mn is added to prevent formation of an undesirable Al-Cu-Fe-Si constituent and acts, to some extent, as a grain refiner. Ti is allowed in limited amounts for its grain refining action. Fe, Cr and Zn are usually present as undesirable impurities. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-276 558 Div. 18
(TISTW/RD) OTS price $1.60

Army Transportation Materiel Command, St. Louis, Mo.
THE WEAPON SYSTEM CONCEPT. BACKGROUND AND BASIC

Division 19 - NAVIGATION
Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

BIBLIOGRAPHY.
Sep 61, 20p. refs.

Unclassified report

DESCRIPTORS: *Operations research, *Air force logistics, *Air force operations, *Management engineering, *Weapons. Logistics, Scheduling, Costs.

19. NAVIGATION

No Entries

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-276 506 Div. 20
(TISTP/WH) OTS price $6.60

General Dynamics/Fort Worth, Tex.
NUCLEAR EMULSION TECHNIQUES FOR THE MEASUREMENT OF FAST-NEUTRON ENERGY SPECTRA,
by C. S. Warren. 15 May 62, 71p. incl. illus. 18 refs. (Document no. NARF 61-36T; FZK-9-159)
(Contract AF 33(657)7201)

Unclassified report

DESCRIPTORS: *Photographic emulsions, *Neutron flux density. Fast neutrons, Radioactive isotopes, Fission neutrons, Radiation counters.

Techniques employed to determine fast-neutron spectra with nuclear emulsions are described in detail. The report is divided into two parts. The general theory involved in the exposure of nuclear emulsions is developed in the first part, along with descriptions of procedures and equipment used. The second part is a presentation and discussion of some of the data obtained with nuclear emulsions. (Author)

AD-276 508 Div. 20, 25
(TISTP/FR) OTS price $2.60

New Hampshire U., Durham.
ASYMPTOTIC DIRECTIONS OF PRIMARY COSMIC-RAY PROTONS ARRIVING AT DURHAM AND MT. WASHINGTON, N. H.,
by M. A. Shea. May 62, 16p. illus. 7 refs.
(Scientific rept. no. 10)
(Contract AF 19(604)4552, Proj. 8600)
(AFCRL 62-453) Unclassified report

DESCRIPTORS: *Cosmic rays, *Protons, *Particle trajectories. Terrestrial magnetism, New Hampshire.

The asymptotic directions for particles of discrete rigidities detected at Mt. Washington and Durham, New Hampshire, are determined by calculating the trajectories of these particles in the geomagnetic field. From these results a lower cutoff rigidity of approximately 1.16 BV and 1.30 BV is assigned to Mt. Washington and Durham respectively. The penumbra effect is discussed in relationship to the study of solar flare associated cosmic-ray increases. A FORTRAN program for converting geographic coordinates to geomagnetic coordinates using high speed computers is also included. (Author)

AD-276 578 Div. 20
(TISTW/RD) OTS price $1.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
ADDITIONAL INVESTIGATIONS OF A PROCEDURE FOR THE DETERMINATION OF HIGH LEVELS OF ACTIVITY OF GAMMA RADIATION SOURCES,
by A. L. Glass. 6 June 62, 6p. tables, 5 refs.
(Rept. no. NAMC AML 1424)

Unclassified report

DESCRIPTORS: *Gamma rays - Sources, *Optics - Polarization. Gamma counters, Radiation counters, Dosimeters, Carbohydrates, Chemical reactions, Sources.

Further investigations were made of the chemical dosimetry method in which the decrease of the optical activity is measured in d(plus) maltose solutions that have been exposed to gamma radiation. An equation for the action of gamma radiation on d(plus) maltose solutions was derived statistically and can be used for calculating the dosage of high levels of radiation. The d(plus) maltose chemical dosimetry method, and the equation developed for the calculations were found to be accurate for sources with dose rates of 3.6 x 1000,000 to 1.0 x 10 to the 6th power rads/hr. and when subjected to total exposure doses of 2.40 x 10 to the 7th power rads to 7.20 x 10 to the 7th power rads. Data concerning the post irradiation effects on the optical activity of solutions are presented. Additional results of investigations into the chemical reactions involved by these irradiations are also presented. (Author)

AD-276 635 Div. 20
(TISTP/WH) OTS price $9.60

Florida State U., Tallahassee.
ANNUAL PROGRESS REPORT FOR YEAR 1961.
Final rept.,
by G. M. Temmer. 1962, 114p. incl. illus. tables.
(Contract AF 49(638)427)

Unclassified report

DESCRIPTORS: *Particle accelerators, *Van de Graaff generators. Nuclear physics laboratories, Instrumentation, Targets.

AD-276 745 Div. 20
(TISTP/JW) OTS price $7.60

Palmer Physical Lab., Princeton U., N. J.
A FILAMENT SCINTILLATION CHAMBER MEASUREMENT OF THE RATE FOR $\mu^- + C^{12} \rightarrow B^{12} + \nu$,
by Donald B. Scarl. 29 May 62, 58p. illus. 30 refs. (Technical rept. no. 30)
(Contract Nonr-185806)

Unclassified report

DESCRIPTORS: *Neutron capture, *Pions, *Cosmic rays, *Mesons. Nuclear reactions, Measurement, Nuclear physics.

Identifiers: Fermi interaction.

To check the predictions of a Universal Fermi Interaction, negative muons were brought to rest in a 1-1/2 inch filament scintillator chamber and the rate for the reaction $\mu^- + C^{12} \rightarrow B^{12} + \nu$ was measured. Ninety-seven B^{12} events were observed, giving a capture rate of $(6.6 \pm .9) \times 10^3$ per second. This number is in agreement with the

predictions of a Universal Fermi Interaction, a pion induced pseudoscalar term with $g_P = + 8\ g_A$, and a conserved weak vector current. An extensive discussion of the construction and operation of the filament chamber and associated image tubes is included. (Author)

AD-276 802 Div. 20, 25, 15
(TISTP/JW) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
ON THE COMPUTATION OF THE MOTION OF ELECTRONS IN A BETATRON WITH AN INCREASING THOROIDAL MAGNETIC FIELD (I Raschetu Dvizheniya Elektronov V Betatrone s Narastayushchim Toroidal'nym Magnitnym Polem),
by N. A. Volosnykh. 24 June 60, 6p. 2 refs. (Trans. no. T-1498 from Izvestiya Vysshikhuchebnykh Zavedeniy 2:46-51, 1961)
Unclassified report

DESCRIPTORS: *Electron accelerators, *Betatrons. Magnetic fields, Electron mass, Electrostatics, USSR.

AD-276 844 Div. 20, 25
(TISTP/JW) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PRELIMINARY ASSIGNMENT OF Si28 EXCITED STATES,
by John D. Baldeschwieler, Thomas R. Jeter, and Kenneth Wallgren. Apr 62, 24p. incl. illus. tables, 17 refs. (BRL Memo. rept. no. 1392) (Proj. 599-04-002)
Unclassified report

DESCRIPTORS: *Gamma proton reactions, *Excitation. Aluminum, Silicon, Nuclear resonance, Nuclei, Measurement, Gamma rays, Nuclear shell models, Radioactive decay.

The gamma-ray cascades from the Al27(proton, gamma)Si28 reactions were used to study the 12.544, 12.911, and 12.918-Mev excited states of Si28. Measurements of the low energy gamma-rays are presented. (Author)

AD-276 918 Div. 20
(TISTW/RD) OTS price $6.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE ANGULAR DISTRIBUTION OF DOSE RATE FROM GAMMA RAYS SCATTERED THROUGH VARIOUS THICKNESSES OF IRON AND ALUMINUM,
by T. S. Dahlstrom and W. E. Thompson. 19 Apr 62, 69p. incl. illus. (NRDL-TR-558)
Unclassified report

DESCRIPTORS: *Gamma rays, *Dose rate. Iron, Aluminum, Scattering, Cobalt, Cesium, Radioactive isotopes, Isotopes, Numerical methods and procedures, Radiological dosage, Gamma ray spectroscopy, Dosimeters, Scintillation counters.

The angular distribution of dose rate resulting from gamma rays of Co-60 and Cs-137 transmitted through various thicknesses of iron (0.737 in. and 1.6 in.) and aluminum (2 in., 4 in., and 9 in.) was measured. These experimental results were compared with Monte Carlo calculations. Comparisons over a limited range of these angular variables were also made with dose-rate distributions calculated from gamma-ray spectrometric data. (Author)

AD-276 926 Div. 20, 25
(TISTP/JW) OTS price $1.60

Nuclear Defense Lab., Army Chemical Center, Md.
THE EFFECT OF BORON-10 SHIELDS ON THE CALIBRATION OF NEUTRON-THRESHOLD DETECTORS,
by John H. McNeilly and John W. Kinch. Sep 61, 16p. incl. illus. tables (Rept. no. NDL TR 9)
Unclassified report

DESCRIPTORS: *Neutron flux density, *Boron. Detectors, Shielding, Measurement, Sintering, Foils, Radiation counters.

The threshold-detector system is calibrated by exposing bare foils to a known neutron flux. When measuring an unknown neutron source, these calibrated foils are exposed in boron-10 shields. The effect of these shields on the measured flux and spectrum is discussed. The results include comparison of data obtained from threshold detectors exposed to a neutron field: (1) in a steel sphere whose periphery is filled with boron-10; (2) in a pressed and sintered boron-10 shield; (3) in a cadmium capsule; and (4) unshielded. There was no significant difference between results obtained from threshold detectors exposed in a pressed and sintered boron-10 shield and the results obtained from threshold detectors exposed in a steel sphere with a boron-10 periphery. The cadmium container and spacers that hold the threshold detectors in the boron-10 shield have no significant effect on the measured neutron flux and spectrum. There is a measurable effect of the boron-10 shield on the neutron flux and spectrum as detected by the threshold detectors within the shield. A 30% neutron-attenuation factor is observed for the sulfur-threshold detector. (Author)

AD-276 934 Div. 20
(TISTB/AW) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 58.
Rept. for 1-31 May 62,
15 June 62, 30p. (REIC Accession List no. 58)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: *Radiation effects. Electronic equipment, Metals, Ceramic materials, Dosimeters, Organic compounds, Inorganic substances, Polymers, Shielding, Laboratories, Space flight.

AD-276 928 Div. 20
(TISTP/TL) OTS price $3.60

Nuclear Defense Lab., Army Chemical Center, Md.
NEUTRON FLUX MEASUREMENTS OF THE TRIGA MARK F REACTOR,
by John H. McNeilly and John W. Kinch. Sep 61, 30p. incl. illus. tables, 7 refs. (Rept. no. NDL TR 12)
Unclassified report

DESCRIPTORS: *Neutrons, *Neutron flux density - Measurement, *Neutron detectors, *Neutron spectrum, *Neutron counters. Design, Tests, Materials, Radiation effects, Experimental data, Tables.

The neutron environment of the Triga Mark F Reactor was determined by using the neutron threshold detector system. A total of 107 measurements was made resulting in 562 separate neutron flux determinations. This analysis contains the results of the measurements and a description of the experimental procedure.

Division 21-NUCLEAR PROPULSION
Division 22-ORDNANCE

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-276 509 Div. 22
(TISTW/JRG) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
METHOD OF CALCULATING PRE-BURNED PROPELLANT GUN PERFORMANCE WITH SPECIAL APPLICATION TO TWO-STAGE GUNS,
by A. E. Seigel. Jan 62, 28p. incl. illus. 11 refs. (Rept. no. NOLTR 61-29)
Unclassified report

DESCRIPTORS: *Hypervelocity guns, *Hypervelocity projectiles - Interior ballistics. Mathematical analysis, Interior ballistics, Propellants, Gases, Friction, Heat transfer, Projectiles.

The method of calculating the behavior of a projectile propelled by a pre-burned propellant in a chambered gun is reviewed. The influence of gas in front of the projectile in the barrel is discussed, as is the procedure to take account of gas frictional and heat-transfer effects. The method of calculation by hand of the performance of two-stage guns is then outlined. Some results obtained from an electronic computing machine are compared with experimental results. (Author)

AD-276 511 Div. 22, 2
(TISTW/RD) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
HASP. A FAMILY OF NAVY METEOROLOGICAL ROCKETS,
by M. J. Parker. Mar 62, 7p. illus. (Rept. no. NOLTR 62-16)
Unclassified report

DESCRIPTORS: *Sounding rockets. Rockets, High altitude, Upper atmosphere, Radar tracking, Radar confusion reflectors, Wind, Pressure, Gun launched, Rocket motors, Parachutes.

The High Altitude Sounding Projectile (HASP) consists of a separable head which is powered by a 3-inch solid propellant rocket motor. The winds-only round uses copper chaff as the payload and has an altitude capability of over 200,000 feet. A metallized parachute, self inflating ROBIN type sphere, and instrument package are other payloads in the HASP family. Radar is used to track the descending device to obtain wind speed and wind direction. (Author)

AD-276 605 Div. 22
(TISTW/JRG) OTS price $8.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EXPLOSIONS IN ICE,
by Clifton W. Livingston. Dec 60, 99p. incl. illus. tables, 12 refs. (Technical rept. no. 75)
(Contract DA 11-190-eng-27, Proj. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Explosives - Test results, *Explosions - Arctic regions, *Ice - Cratering. Climatic factors, Greenland, Glaciers, Blast, Pressure, Shock waves, Seismic waves, Measurement, Fracture (Mechanics), Mathematical analysis.

Twenty-four instrumented and 106 uninstrumented blasts ranging in weight from 2.5 to 40 lb of four types of explosives were detonated above, in contact with, and at various depths below the ice surface. The tests were conducted at the edge of the Greenland Ice Cap, near Camp Tuto, during the summer of 1957. Under-ice direct shock pressure, air-induced under-ice shock pressure, and airblast pressure from shallow under-ice bursts, contact bursts, and near-contact bursts were measured. The apparent crater and the true crater were measured, and the mechanics of the fracture process were studied. The height to which the flyrock was thrown was measured using motion pictures, and ground rise and venting phenomena were studied. Sixty-six seismic records were taken. (Author)

AD-276 670 Div. 22
(TISTW/RD) OTS price $4.60

Ammunition Development Div., Picatinny Arsenal, Dover, N. J.
SHELL. A COMPUTER PROGRAM FOR DETERMINING THE PHYSICAL PROPERTIES OF ARTILLERY SHELL AND RELATED ITEMS,
by Jay L. Politzer. May 62, 45p. incl. illus. (Technical memo rept. no. ORDBB-DR1-14; SAAS no. 36)
Unclassified report

DESCRIPTORS: *Projectiles - Physical properties. Computers, Physical properties, Punched card methods, Indexes, Programming, Ammunition, Artillery.

The Shell program is a logical device for determining the weight, polar and transverse moments of inertia, total moment of inertia, volume, and center of gravity of artillery shell and related items by means of a computer. This report explains the use of the program and is intended for the engineer who is familiar with the calculations. No knowledge of computers or programming is assumed. (Author)

AD-276 807 Div. 22
(TISTW/JRG) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
CUTTING AND DEMOLISHING HOLLOW EXPLOSIVE CHARGES - TECHNICAL CHARACTERISTICS OF EMPLOYMENT.
1961, 13p. incl. illus. table (Trans. no. T-1621)
Unclassified report

DESCRIPTORS: *Shaped charges, *Explosives, *Demolitions. Demolition, Structures, Bridges, Reinforced concrete, Tools, Handling, Operation, Transportation.

Contents:
Cutting (T) hollow charges
  Description
  Transporting and handling
  Selection of charge
Demolishing (D) hollow charge
  Description
  Transporting and handling
  Effective range of charge
Nail-driving gun

AD-276 837 Div. 22
(TISTW/JRG) OTS price $5.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
EXPLORATORY ESTIMATES OF THE EFFECT OF RAIN ON

ARTILLERY FIRE,
by Serge J. Zaroodny. Feb 62, 60p. incl. illus. table, 13 refs. (BRL memo. rept. no. 1389)
(Proj. 503-03-001)
Unclassified report

DESCRIPTORS: *Artillery fire, *Projectile trajectories, *Precipitation, *Clouds. Projectiles, Range, Drag, Atmosphere, Density, Wind, Climatic factors, Meteorology, Errors, Raindrops, Energy, Statistical analysis, Fragmentation.

This exploratory investigation is only a preliminary step in deciding whether a correction of an indirect artillery fire for rain, and for the presence of clouds along a trajectory of the projectile need be considered. The study attempts only a rough estimate of the possible range of the results of a more thorough investigation. An example, based on the max range of the 105mm howitzer and a mildly heavy rain is given. Only one novel coefficient has been computed: this is the usually-neglected effect of the vertical wind. It is tentatively concluded that the principal effect of rain is the theoretically-measurable meteorological effects of the saturation of air with water vapor. Outside of these, the rain may have a significant effect only if it is very heavy, and extends over a large segment of the trajectory of the projectile. (Author)

AD-276 840 Div. 22
(TISTW/JRG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
INITIATING CIRCUIT AND TIME DELAY FOR MULTIPLE ELECTRIC DETONATORS,
by Bernard Soroka and Jacob Wenig. Mar 62, 18p. incl. illus. (BRL Technical note no. 1457)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Firing circuits, *Electric detonators, *Pulse generators, *Time interval counters. Electronic equipment, Potentiometers, Test equipment, Design.

An electronic time delay and double power pulse generator are described. The unit can energize two electric explosive initiators with an accurate time interval between initiations that is variable between the limits of 2 to 102 msec. Selection of delay time is produced by means of a continuously variable ten-turn helical potentiometer. (Author)

AD-276 898 Div. 22, 12
(TISTW/EET) OTS price $8.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Final summary rept., 1 Nov 61-31 Mar 62,
by L. W. Ricketts. 18 May 62, 80p. incl. illus. tables.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices - Guided missiles. Guided missile warheads, Warheads, Safety, Electronic equipment, Strain gages, Semiconductors, Transducers, Direct current, Amplifiers, Circuits, Switching circuits, Trigger circuits, Timing circuits, Design, Vibration, Acceleration, Temperature, Shock resistance, Army, Transistors, Solid state physics.

The accomplishments made during the four-month research and development program on the solid state arm safe device are summarized. The purpose of the program was to design, develop, and fabricate electronic solid state arm safe devices capable of functioning in various warheads for Army missiles under a wide range of environmental conditions. The output is to have a solid state switching circuit that will provide an electrical pulse after the missile has traveled a preselected distance from the launch site. Technical material is presented chronologically with frank evaluation of each phase and of each model. Statements evaluating the devices as to simplicity, reliability, and safety are common. The details of the design changes required from one model to another are elaborated upon. Improvements of resolutions and accuracy over wide G levels are discussed. (Author)

AD-276 911 Div. 22
(TISTW/JRG) OTS price $.75

Naval Ordnance Lab., White Oak, Md.
THE EXPLOSIVE RELEASE OF GAS GUN DIAPHRAGMS,
by Rayner A. Montgomery and E. Eugene Kilmer. Mar 62, 20p. incl. illus. tables (Ballistics research rept. no. 58; NOLTR 61-165)
Unclassified report

DESCRIPTORS: *Hypervelocity guns - Safety devices, *Diaphragms (Mechanics) - Rupture. Test facilities, Stainless steel, Pressure, Interior ballistics, Hazards, Shaped charges, Explosives, Helium, Hydrogen, Propellants.

An experimental investigation was conducted to determine the feasibility of using explosive materials to open the diaphragm used for the release of the chamber pressure in a 4-in. gas model launcher. A method was developed, using linear-shaped mild detonating fuse for controlled rupture of the stainless steel diaphragm. The diaphragm is ruptured at a predetermined delay time after the gas propellant has reached a given pressure. The tests show that diaphragms can be ruptured at chamber pressures up to 10,500 psi under the ultimate rupture pressure for the diaphragm. (Author)

AD-276 950 Div. 22
(TISTW/RD) OTS price $4.60

Sundstrand Aviation Div., Rockford, Ill.
DESIGN, AND DETAIL OF AN AUXILIARY, PROPELLED 105 MM HOWITZER.
Final technical rept.,
by W. J. Zwierzycki. Apr 62, 45p. incl. illus. tables.
(Contract DA 11-070-508-ORD-1343)
Unclassified report

DESCRIPTORS: *Howitzers - Propulsion. Hydraulic pressure pumps, Hydraulic systems, Auxiliary power plants, Hydraulic reservoirs.

Considerations involved in the design and detailing of an auxiliary propulsion system for the 105mm howitzer are summarized. The design is based on hydraulic pumps and motors which use the same basic parts as the hydraulic units used on the auxiliary propelled 155mm howitzer. The basis for selecting the engine, pump and hydraulic motor is discussed along with the calculations used to arrive at the final drive ratio, the weapon's top speed and range and the magnitude of the hydraulic line losses. All of the remaining items required by the system are treated separately.

AD-276 971 Div. 22
(TISTW/RD) OTS price $4.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
SIX VARIABLE BALLISTIC MODEL FOR A ROCKET,
by Everett L. Walter. June 62, 45p. incl. illus. (Technical rept. no. MM-445)
Unclassified report

Division 23-PERSONNEL AND TRAINING
Division 24-PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

DESCRIPTORS: *Rockets - Aerodynamics, *Sounding rockets. Mathematical analysis, Damping, Equations, Motion, Pitch, Yaw, Roll, Aerodynamics, Interior ballistics, Drag, Lift, Perturbation theory, Exterior ballistics, Numerical analysis, Moments.

The equations of motion which describe the position in space, the pitch, yaw, and roll of an unguided rocket are developed. Some effects considered are those of gravity, thrust, spin rockets, canted fins, aerodynamic forces and moments, loss of mass, rotation of the earth, wind, variable speed of sound, and variable atmospheric pressure. The vector forces and moments are defined and resolved into suitable components from which the equations of motion are derived. The problem of numerical integration of these equations is discussed. How perturbation techniques can be used to increase the computation speed is shown. Applications of the resulting mathematical models including prediction of the impact point for real-time support of an actual firing are explained. (Author)

AD-276 986 Div. 22, 30
(TISTW/JRG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PRESSURE PROFILES OF DETONATING BARATOL MEASURED WITH SULPHUR GAUGES,
by G. E. Hauver and P. H. Netherwood. Mar 62, 21p. incl. illus. 6 refs. (BRL technical note no. 1452)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Sulfur - Electrical conductance, *Pressure gages - Design, *Explosives - Blast. Detonation, Pressure, Measurement, Calibration, Barium compounds, Nitrates, Tests.

The dependence of the electrical conductivity of sulfur upon pressure is used to measure a pressure-time profile for detonating Baratol. The measurements indicate an initial pressure spike and tend to further confirm the hydrodynamic theory of detonation proposed by von Neumann. Preparation of sulfur gauges, method of calibration and preliminary performance tests are described. (Author)

23. PERSONNEL AND TRAINING

AD-276 923 Div. 23, 28
(TISTB/MS) OTS price $5.60

Personnel Research and Development Corp., Cleveland, Ohio.
A PROCEDURE FOR THE EMPIRICAL VALIDATION OF CURRICULUM CONTENT.
Final rept.,
by Erwin K. Taylor. 31 Dec 61, 48p. incl. illus. tables, 6 refs.
(Contract Nonr-283400)
Unclassified report

DESCRIPTORS: *Training - Reliability, *Military training, *Naval personnel - Effectiveness. Maintenance personnel, Achievement tests, Statistical analysis.

An attempt was made to employ a ''follow-back'' technique to validate the several phase grades in Electrician's Mate ''A'' and in Electricity and Electronics ''P'' Schools against an eight-part performance test administered to more than 200 functioning electrician's mates. Predictor data (school grades) were to be obtained from record cards on file in the Navy Records Center. School record cards could be located for only 96 of the men tested. These were often incomplete and lacked a uniform metric. This precluded completion of the multiple correlation analysis originally planned. Consequently, results were inconclusive. Zero order validities of phase grades against the performance test were disappointingly low. (Author)

AD-276 947 Div. 23, 6
(TISTW/DLW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
THE APPLICATION OF DISCRIMINATION TRAINING TO DETECTION IN A VIGILANCE TASK,
by M. Stephen Sheldon, Eugene Erickson and Dennis Katter. 3 Apr 62, 9p. 6 refs. (Technical memo. no. TM-672/000/01; Supersedes Technical memo. no. TM-672/000/00)
(Contract AF 30(635)24387)
Unclassified report

DESCRIPTORS: *Target recognition - Military training, *Radar operators - Training, *Military training - Effectiveness, *Radar targets - Identification, *Radar tracking. Radar signals, Detection, Radar interference, Signal-to-noise ratio, Noise (Radar), Tests.

The results are presented of two experiments which tested the effectiveness of a read-through training program. The code name for this program is project LOOK. The experiments were designed to answer two questions: (1) Can experienced operators in the SAGE air surveillance subsystem be taught to improve their performance in discriminating between wanted and unwanted radar signals. (2) Which elements of the training program are effective in accomplishing the improved system performance. Experimental results indicate that read-through training might be a profitable approach in helping solve system problems related to noise. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-276 627 Div. 24, 18
(TISTA/VGW) OTS price $3.60

Dunlap and Associates, Inc., Santa Monica, Calif.
INVESTIGATION OF ADDITIVE COLOR PHOTOGRAPHY AND PROJECTION FOR MILITARY PHOTO-INTERPRETATION. IV. REVIEW OF PROGRAM AND COMPARISON OF ADDITIVE COLOR WITH TYPICAL PANCHROMATIC PHOTOGRAPHY,
by Richard P. Winterberg and Joseph W. Wulfeck. Mar 62, 32p. incl. illus. table, 3 refs.
(Technical rept. no. 4)
(Contract Nonr-313700)
Unclassified report

DESCRIPTORS: *Aerial photography - Photo interpretability, *Color photography - Photo interpretability. Detection, Surface targets, Effectiveness, Photographic intelligence.

Study of the application of additive color photographic techniques to military photo-interpretation is summarized. Findings of a limited examination of additive color versus a set of comparison aerial photographs of military type targets are reported. At this state of the evaluation program, it is possible to make some fairly confident preliminary judgments about the potential of a given, unmodified additive color photographic system for increasing photo-reconnaissance information. Included is a review of the assumptions and hypotheses which have been generated and the steps which were taken to test those hypotheses. (Author)

AD-276 663 Div. 24
(TISTA/VGW) OTS price $1.60

Aeronautical Photographic Experimental Lab., Naval Air Development Center, Johnsville, Pa.
MODIFICATION OF KB-14A AND P-220 CAMERAS.
20 Mar 62, 11p. incl. illus. (Rept. no. NADC AP-L6202)
Unclassified report

DESCRIPTORS: *Aerial cameras - Design. High altitude, Aerial photography, Photographic lenses.

In developing special photographic packages and installations for use in high altitude balloon and rocket vehicle photography, the possibility of adapting the P-220, 70mm aerial camera to these applications through suitable modification was explored. Specific design changes and modification procedures were developed to adapt the P-220 and KB-14A cameras to the operational and installation requirements. Because of increasing demand for high altitude cameras with compactness and operating features of the modified P-220 camera, it was desirable to consolidate and optimize these features into a single over-all design with suitable engineering drawings. The report covers redesign work accomplished on the P-220 and KB-14A cameras and includes the applicable engineering drawings. Lack of a fully effective film flattening device in the present P-220 camera led to the development of a more effective method of flattening the film employing completely different principles of operation. The existing pressure plate applies a constant pressure on the film at the edges of the image format. As the pressure is not applied over the entire format, the film is not held precisely in the focal plane at all points within the format area. The report covers incorporation of a retractable pressure plate in the magazine, and a fixed glass plate in the body of the P-220 and KB-14A cameras to accurately locate the focal plane. (Author)

AD-276 746 Div. 24, 18
(TISTA/VGW) OTS price $13.00

Philco Corp., Blue Bell, Pa.
ELECTRONIC CORRELATION TECHNIQUES FOR CHANGE DETECTION.
Final rept., 17 Apr 61-17 Jan 62,
by Thomas J. Harley, Jr. 17 Feb 62, 54p. incl. illus. tables (Rept. no. 9034-F)
(Contract AF 30(602)2473, Proj. 6244)
(RADC TDR 62-128) Unclassified report

DESCRIPTORS: *Aerial reconnaissance - Data processing systems, *Photo interpretation - Correlation techniques, *Photographic intelligence - Surface targets. Aerial photographs, Distortion, Analog systems, Mapping, Mathematical analysis.

Several alternative electronic-correlation techniques to detect significant change in repeat-cover aerial photography are considered. The most promising techniques are shown to involve analyzing each photograph for its local significance before attempting detection of change. Success in distinguishing significant from trivial change appears directly related to ability to first analyze significance. A particular system organization is developed based on cross-correlation of transformed, abstracted, and spatially quantized representations of the photography called feature maps. Through simulation on the Philco 2000 computer, the system is shown effective in detecting the appearance or disappearance of man-made structures while ignoring changes in shadowing and/or minor misregistrations. Desired improvements in detailed system logic are discussed. To maximize utility, the change-detection equipment should be supported with automatic rectification equipment and an image-information storage and retrieval system that automatically locates the repeat-cover images in the library and aligns them with the new photographs for analysis. Candidate systems to perform these supporting functions are reviewed and evaluated. (Author)

25. PHYSICS

AD-276 520 Div. 25, 30
(TISTP/WH) OTS price $6.60

James Forrestal Research Center, Princeton U., N. J.
HOT-WIRE HEAT LOSS AND FLUCTUATION SENSITIVITY FOR INCOMPRESSIBLE FLOW,
by W. H. Webb. Jan 62. 61p. incl. illus. tables, 14 refs. (Rept. no. 596)
(Contract AF 49(638)465)
(AFOSR-2303) Unclassified report

DESCRIPTORS: *Heat transfer, *Convection, *Anemometers. Gas flow, Wire, Instrumentation.

An experimental study of the forced convection heat loss from long thin cylinders placed normal to an incompressible flow was carried out. Tests were made in three different gases (air, argon, helium) at atmospheric pressure and in air over a pressure range 0.2 to 8 atm. Particular attention was given to determining the effect of cylinder temperature on the heat loss. It was found that the constants employed in the usual empirical representation of this heat loss vary with cylinder temperature in a way dependent on Knudsen number, results in helium giving a marked indication of this. A velocity fluctuation sensitivity equation was derived which includes the effects of this temperature variation. (Author)

AD-276 523 Div. 25, 17
(TISTM/BRW) OTS price $2.25

Pennsylvania State U., University Park.
RESEARCH INVESTIGATION ON STRAIN ANALYSIS OF METAL SHEETS WITH NOTCHES AND CRACKS.
Final technical rept. on Mechanics of Flight,
by G. U. Oppel, P. W. Hill, and H. Richter.
Mar 62, 71p. incl. illus. tables.
(Contract AF 33(616)7298, Proj. 7063)
(ARL 62-317) Unclassified report

DESCRIPTORS: *Sheets, *Metal plates. Deformation, Analysis, Fracture (Mechanics), Photoelastic materials, Tensile properties, Stresses, Aluminum alloys, Optical analysis, Microscopy, Interferometers.

The report presents experimental observations and measurements concerning the strain distribution and changes of the strain distribution at the base of semi-circular notches and at the base of cracks in thin flat metal sheets. The metal sheets were subjected to static and to fluctuating tensile loading. The photoelastic coating method and a method utilizing Newton interference fringes were used to perform the strain observations and measurements. With both methods applied to semi-circular notches, a so-called necking zone could be observed. It was found that the necking zone must have a certain magnitude before cracks are formed at the base of the notch. New details concerning the geometry and magnitude of the strain distribution and its changes were also observed at the base of cracks in thin metal sheets using the interferometric method. To the best of the author's knowledge, this is the first time that this method has been applied to strain analysis around cracks in metal. The residual and total strain distribution, for static loading, at the base of cracks were obtained thusly. Data on the rate of crack propagation and its relationship to the varying areas of permanent deformation around cracks have also been recorded. (Author)

AD-276 528 Div. 25, 15
(TISTP/JW) OTS price $2.60

Raytheon Co., Wayland, Mass.
THE WEAK-FIELD LORENTZ GAS AND A PERTURBATION THEORY OF APPROXIMATE SOLUTION TO THE BOLTZMANN EQUATION,
by William A. Janos. Mar 62, 19p. 10 refs.
(Scientific rept. no. 1)
(Contract AF 19(604)7339, Projs. 4619 and 5561)
(AFCRL-62-193) Unclassified report

Presented at the Fifth International Symposium on Ionization Phenomena, Aug 28-Sep 1, 1961, Munich, Germany.

DESCRIPTORS: *Plasma physics, *Gas ionization. Electrons, Perturbation theory, Magnetic Fields, Gases, Special functions.

The Lorentz gas model of the Boltzmann equation is solved in closed form for conditions approximating weak external field effects, and proximity to equilibrium. General methods of perturbation theory are devised to obtain bounds for the validity of the approximation in terms related to errors in derived expectation values due to the use of the approximate distribution function. The zero-field solution is derived exactly in closed form and serves in a modified and specific manner as the weak-field approximation. The weak-field solution is shown to portray on the average the property of decay to equilibrium expected for a perturbation of the zero-field distribution function. Quantitative upper bounds are established on the field magnitudes in terms of number density of neutral atomic scatters, and time duration for weak-field effects. An example is given of the approximation technique applied to an initially Maxwellian distribution. (Author)

AD-276 535 Div. 25, 12
(TISTP/JW) OTS price $5.60

RAND Corp., Santa Monica, Calif.
THE PRECESSION OF SPINNING BODIES DUE TO GRAVITATIONAL GRADIENT TORQUES,
by T. B. Garber. June 62, 47p. incl. illus. 9 refs. (Memo. no. RM-3191-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Space environmental conditions, *Centrifugal fields. Torque, Spin, Gravity, Spaceships, Gyroscopes.

The results are presented of an analytical investigation of the precessional motion of spinning bodies due to gravitational gradient torques. The motion of the center of mass of the body is restricted to circular or near-circular orbits. However, the secular regression of the orbital plane due to the earth's oblateness is considered. In the analysis of the rotational motion of the body about its center of mass, it is assumed that the gravitational gradient torques are small perturbations. The unperturbed body is perfectly stabilized with respect to inertial space. Within this framework, solutions are obtained for the precessional motion of a body with an arbitrary mass distribution. It is concluded that for low spin rates of the order of 0.1 rad/sec, the change in body attitude due to the gravitational gradient torques alone might be as great as 17 degrees after a period of five days. For a gyroscopic instrument with a spin rate of 2000 rad/sec, an attitude error of 1 min. can develop after a period of 40 days. (Author)

AD-276 550 Div. 25
(TISTP/FR) OTS price $3.60

Electrical Engineering Research Lab., U. of Texas, Austin.
DISPERSION AT MILLIMETER WAVELENGTHS IN METHYL AND ETHYL ALCOHOLS,
by J. A. Saxton, R. A. Bond and others.
31 May 62, 26p. incl. illus. tables, 10 refs.
(Rept. no. 7-21)
(Grant no. DA-SIG-36-039-61-G11)
Unclassified report

DESCRIPTORS: *Ethanols, *Methanols, *Scattering. Dielectric properties, Radio waves, Extremely high frequency, Absorption.

The report describes measurements, made by a free wave technique, of the dielectric properties of methyl and ethyl alcohols at wavelengths of 3.11, 4.30 and 9.04 mm. The observations are analyzed in relation to the theory of dispersion and, in conjunction with previously existing measurements at adjacent wavelengths, provide evidence of a second dispersion region at radio frequencies in each liquid in addition to the main one normally associated with Debye-type dipole rotation phenomena. (Author)

AD-276 553 Div. 25
(TISTP/DAW) OTS price $3.60

Woods Hole Oceanographic Institution, Mass.
PREDICTING SONIC PULSE SHAPES OF UNDERWATER SPARK DISCHARGES,
by David D. Caufield. Mar 62, 16p. illus. 9 refs.
(Ref. no. 62-12)
(Contract Nonr-136700, Proj. NR 261-103)
Unclassified report

DESCRIPTORS: *Wave analysis, *Underwater sound generators, *Electric discharges. Capacitors, Circuits, Fourier analysis, Underwater sound, Shock waves, Sparks, Underwater sound transmission, Ocean bottom, Waveform generators, Pulse generators, Transmission lines.

Measurements of the acoustic pressure of spark discharges were made at a shallow depth (10 feet) for various voltages, stored energies, inductances and capacitances of the system, and electrode areas. The voltages ranged from 1500 V to 11 KV, and the energy storing capacitances from 8 to 800 microfarads. In this range the peak pressure observed was proportional to peak current and the decay constant of the pressure-time curve was essentially the same as the electrical discharge decay constant. (Author)

AD-276 567 Div. 25
(TISTP/JW) OTS price $3.60

Duke U., Durham, N. C.
BOUSSINESQ'S PROBLEM FOR A HEATED PUNCH. II. SOLUTION FOR A CYLINDRICAL PUNCH. III. SOLUTION FOR A CONICAL PUNCH,
by D. L. George and I. N. Sneddon. Sep 61, 35p. incl. illus. table, 16 refs.
(Contract AF 49(638)892, Proj. 9769)
(AFOSR-2734)
Unclassified report

DESCRIPTORS: *Load distribution, *Thermal stresses. Pressure, Elasticity, Cylindrical bodies, Conical bodies, Stresses, Sheets, Special functions, Deformation.

The stress distribution is analyzed which is set up in a semi-infinite body when its free plane boundary is deformed by the pressure against it of a rigid punch of the form of a flat-ended cylinder or a right circular cone.

AD-276 577 Div. 25
(TISTP/WH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
FERROMAGNETIC RESONANCE MEASUREMENTS IN GARNETS,
by G. E. McDuffie, Jr., R. F. Stauder, and L. J. Schwee. 15 Mar 62, 34p. incl. illus. tables, 16 refs. (Rept. no. NOLTR 62-34)
Unclassified report

DESCRIPTORS: *Nuclear magnetic resonance, *Ferromagnetic materials. Garnet, Instrumentation, Laboratory equipment, Microwave spectroscopy.

Details of techniques used for low power linewidth determinations and high power non-linear susceptibility measurements of polycrystalline garnet materials at X-band are presented. It is pointed out that errors resulting from procedures employed are negligible for the range of linewidths encountered in polycrystalline garnet materials. Effects on the linewidth and on the dc magnetic field necessary for resonance produced by single crystal grains in the polycrystalline material are discussed. (Author)

AD-276 579 Div. 25, 20
(TISTP/JW) OTS price $5.60

Nevis Cyclotron Lab., Columbia U., Irvington-on-Hudson, N. Y.
MU MESONIC ATOM STUDIES OF Ti, Fe, Cu, Zn, Tl, Pb, Bi,
by W. Frati and J. Rainwater. 1961, 56p. incl. illus. tables, 16 refs. (Rept. no. R-323; Rept. no. NEVIS-105; Rept. no. CU-212)
(Contract Nonr-26672)
Unclassified report

DESCRIPTORS: *Meson bombardment, *Electrons, *Scattering. Lead, Iron, Zinc, Copper, Titanium, Bismuth, Thallium, Electron transitions, Atoms, X rays.

Results of a precision re-evaluation of the mu-mesonic x-ray transition energies for Tl, Pb, Bi, Ti, Fe, Cu, and Zn are presented. The 2p-1s and 3d-2p transition regions were studied for Tl, Pb, and Bi, and the 2p fine structure splitting was determined with good precision from both sets of measurements. The Tl, Pb, and Bi transition energies were determined to about 0.2%, while the 2p state fine structure splitting was determined to within 2 to 3%. The results are in good agreement with the theoretically predicted values of Ford and Wills, based on the charge distributions implied from the high energy electron scattering experiments. (Author)

AD-276 597 Div. 25, 7
(TISTP/FR) OTS price $8.10

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 1, 15 Mar-15 June 62.
15 June 62, 1v. incl. illus. tables, 2 refs.
(Contract AF 33(657)8311)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Generators. Plasma jets, Thermodynamics, Cesium, Helium, Tantalum.

The problem areas peculiar to closed-loop operation of an MHD generator were investigated. The closed-loop will consist of essentially an MHD motor-generator set. The MHD motor will circulate the gases within the closed-loop and the MHD

generator will abstract some electrical energy from the flowing stream. As a research tool, a closed-loop MHD motor-generator device has definite advantages over that of a straight-through device. The major advantage of the closed-loop is that it can be operated economically under steady long term operating conditions, thereby affording sufficient time for careful investigation of the state of the gas, the potential distribution, the current and power distribution, the leakage currents, the behavior of the sidewall and electrode materials, and the effects of operating parameters on performance of both the motor and generator sections. (Author)

AD-276 624 Div. 25
(TISTP/JW) OTS price $8.10

California U., Los Angeles.
EXCITATION OF NITRIC OXIDE AND ATOMIC OXYGEN IN AFTERGLOW SOURCES,
by William J. Schade. July 61, 73p. incl. illus. refs. (Technical rept. no. 1)
(Contract AF 19(604)6657, Proj. 7635)
(AFCRL 62-450) Unclassified report

DESCRIPTORS: *Aurorae, *Molecules, *Dissociation. Recombination reactions, Excitation, Nitrogen, Nitrogen compounds, Oxygen, Oxygen compounds, Molecular spectroscopy.

The afterglow emission intensities of the nitrogen first positive bands, the nitric oxide beta, gamma, and delta bands, and the atomic oxygen green line were examined under conditions in which the constituents of the afterglow source were varied chemically. The nature of the particles that interact to produce excited nitric oxide molecules and excited oxygen atoms in afterglow sources were determined. The results were applied to the excitation of atomic oxygen in the upper atmosphere of the earth. In the past, the excitation of atomic oxygen in the upper atmosphere has been explained by the Chapman process in which three oxygen atoms collided to form molecular oxygen and excited atomic oxygen in the 1S state. The laboratory experiments presented here do not support the Chapman process; under favorable conditions for the Chapman process, the intensity of the atomic oxygen green line approached zero. The excitation process that gives rise to the green line in laboratory afterflows probably is not operative in the upper atomophere because of the expected low density of atomic nitrogen at altitudes where emission of OI 5577 originates. (Author)

AD-276 628 Div. 25
(TISTP/DAW) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
THE ESTIMATION OF POWER SPECTRA,
by Joseph Bram. June 62, 37p. 4 refs. (Rept. no. 1611)
Unclassified report

DESCRIPTORS: *Statistical processes, *Power, *Electrical networks, *Analysis of variance. Matrix algebra, Fourier analysis.

Given a discrete normal stationary process $\{x_n\}$, with covariances $\{\rho_n\}$ and cumulative power spectrum $F(\Theta)$, $-\pi<\Theta<\pi$, it is important to be able to get estimates of quantities such as ρ_n and $\frac{1}{2\pi}\int_{-\pi}^{\pi} w(\Theta)\, dF(\Theta)$, where $w(\Theta)$ is an even weighting-function, and to be able to state the variability of these estimates. This analysis develops the theory necessary for these estimates. (Author)

AD-276 645 Div. 25
(TISTP/FR) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
REFLECTION AND DISSOCIATION OF H2 ON TUNGSTEN,
by Joe N. Smith, Jr. and Wade L. Fite. 28 May 62, 23p. incl. illus. 14 refs. (Rept. no. GA-3009)
(Contract AF 49(638)356)
(AFOSR-2611) Unclassified report

DESCRIPTORS: *Hydrogen, *Dissociation, *Tungsten. Mass spectroscopy, Vacuum systems, Electron beams.

Through the use of modulated atomic beam techniques, the reflection and dissociation of H2 at a tungsten surface above 2500 K was studied. Two experimental configurations were employed. In the first configuration, a collimated beam of molecular hydrogen was directed at the tungsten surface, and the angular distribution of particles evaporating from the surface was examined mass-spectrometrically. In the second configuration, the tungsten test surface was located in the first of three differentially pumped vacuum chambers. H2 was admitted into this chamber thereby providing an isotropic source of incident particles. Particles evaporating from the surface were collimated and examined mass-spectrometrically in the third chamber. From these experiments it is observed that at high temperatures the angular distribution of atomic hydrogen evaporating from the target surface obeys the cosine law. However, the angular distribution of reflected H2 displays a shift toward the specular ray. Above 2500 K the sticking probability of H2 on tungsten approaches a limiting value of 0.3. (Author)

AD-276 648 Div. 25
(TISTP/JW) OTS price $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
HALL EFFECTS IN A LORENTZ GAS,
by G. W. Sutton. 10 Jan 61, 13p. 8 refs.
(Contract AF 49(638)914)
(AFOSR-462) Unclassified report

DESCRIPTORS: *Electromagnetic fields, *Electron mass, *Hall effect. Gases, Conductivity, Magnetic fields, Particles, Ionization.

For a Lorentz gas, expressions are derived for the direct and transverse electron electrical conductivities for an arbitrary inverse-power interaction force with the heavy particles. The results are compared to the simple kinetic model for the electron motion. The simplified equation is not general for small magnetic fields but is correct for large magnetic fields. For inverse powers greater than 3, the error is less than 15%. (Author)

AD-276 650 Div. 25
(TISTP/JW) OTS price $7.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
STUDIES OF THE PHENOMENA OCCURRING IN AN ELECTROMAGNETIC SHOCK TUBE,
by Evan R. Pugh. 1962, 68p. incl. illus. 15 refs.
(Contract Nonr-40125)
Unclassified report

DESCRIPTORS: *Shock waves, *Electromagnetic waves. Electric fields, Conductivity, Magnetohydrodynamics, Gases, Velocity, Density, Electromagnetic fields.

An electromagnetic shock tube was constructed and the observed phenomena explained assuming that the energy transferred to the driver section is stored in the form of magnetic energy. The velocity of the shock front and its rate of decay were measured and compared with theoretical predictions based upon the infinite conductivity magnetohydrodynamic flow equations. A Kerr cell shutter camera was used to photograph the shock fronts which were found to be jumbled, suggesting magnetic turbulence. A magnetic field was applied along the axis of the shock tube and its effect on the shock velocity and on the character of the shock front were explained by the interaction of the driver currents with the applied axial magnetic field. A ''precursor'' wave was observed and the gas velocity behind it measured using the boundary layer on a probe placed along the axis of the shock tube. This value of the gas velocity and measured values of the wave velocity, gas density and electric field strength are shown to be compatible with a wave-type mechanism. (Author)

AD-276 658 Div. 25
(TISTP/JW) OTS price $1.10

Naval Research Lab., Washington, D. C.
THE INTERACTION MECHANICAL RADIATION IMPEDANCE BETWEEN TWO PISTONS ARBITRARILY ORIENTED IN SPACE WITHOUT A BAFFLE,
by S. Hanish. 15 May 62, 5p. 5 refs. (NRL rept. no. 5789)
Unclassified report

DESCRIPTORS: *Acoustic impedance, *Special functions. Pistons, Mechanical engineering, Sound generators.

Two pistons with enclosed backs located on the imaginary surface of a geometric sphere and generating sound in a coupling fluid medium interact with each other mechanically. Neglecting scattering effects, and restricting the analysis to the evaluation of the acoustic pressure over the second piston face due to the motion of the first piston, an equation is derived for the interaction mechanical radiation impedance coefficient between these two pistons without baffles. The derived formula is compared with the known formula for the interaction impedance between two pistons in a rigid spherical baffle. Although the derived formula is in the form of an infinite series, no actual numerical computation is performed because of the complexity of the terms in the series. (Author)

AD-276 705 Div. 25
(TISTP/TL) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
WAVES ALONG HOMOGENEOUS PLASMA LAYERS (Wellen langs homogener Plasmaschichten),
by W. O. Schumann, tr. by Paul D. Maffeo. Apr 62, 7p. incl. illus. (Trans. no. ETRG-62-7 of Proceedings of the Mathematical and Natural Science Division of the Bavarian Academy of Science in Munich, pp. 255-261, 1948)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Plasma physics, *Atmosphere, *Wave transmission. Electromagnetic theory, Partial differential equations, Boundary layer, Electric fields, Rotation, Electrons, Electric discharges, Vortices, Diffusion, Re-entry aerodynamics

AD-276 706 Div. 25
(TISTP/JW) OTS price $1.60

Emmanuel Coll. Research Language Center, Boston, Mass.
VERTICAL DRIFT OF THE F-LAYER DURING ''NEGATIVE'' EARTH MAGNETIC BAY DISTURBANCES (Vertikale Drift der F-Schicht wahrend ''negativer'' erdmagnetischer Bai-Storungen),
by Harry Kohl, tr. by Paul Maffeo. 25 Nov 61, 11p. incl. illus. 3 refs. (Trans. no. ETR-61-2 of Max-Planck Institute of Aeronomy, Institute of Ionospheric Physics, Lindau on Northeim, Hanover 15:293-295, 1961)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Ionosphere disturbances, *Magnetic fields, *Terrestrial magnetism. Earth, Drift, Translations.

The vertical drift of the F-layer during earth magnetic bay disturbances was investigated. Previous experimental data indicated that for positive increments of H and D (where H and D are horizontal components of the earth's magnetic field), a layer rise occurred. A lowering of the field would be expected for negative H and D increments. Five bays were investigated. The expected effect was confirmed with certainty in only two cases.

AD-276 707 Div. 25
(TISTP/FR) OTS price $1.60

Emmanuel Coll. Research Language Center, Boston, Mass.
ELECTRICAL PROPERTIES OF SELENIUM WITH ADMIXTURE OF BISMUTH,
by B. D. Aliev, G. B. Adbulaev, and G. M. Aliev. 2 Dec 61, 11p. incl. illus. 18 refs. (Trans. no. ETR 61-5 from Bulletin of the Academy of Sciences Azerbaidzhan S. S. R., Series of Physico-Mathematical and Technical Sciences no. 2, pp. 57-62, 1960)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Selenium, *Bismuth, *Chemical impurities. Electrical conductance, Temperature, Thermoelectricity.

AD-276 726 Div. 25
(TISTP/JW) OTS price $8.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
ELECTRIC QUADRUPOLE SPLITTING AND THE NUCLEAR VOLUME EFFECT IN THE IONIC COMPOUNDS OF IRON-57,
by Robert L. Ingalls. 1 May 62, 86p. incl. illus. tables, 52 refs. (Technical rept. no. 2)
(Contract Nonr-76020, Proj. NR 018-204)
Unclassified report

DESCRIPTORS: *Nuclear fluorescent scattering, *Nuclear resonance, *Iron. Ions, Polarization, Excitation, Quadrupole moments, Electron mass, Isotopes.

Mossbauer spectra have been observed in a number of divalent and trivalent Fe57 ionic compounds at temperatures ranging from 77 K to 300 K. Relative energy shifts of the spectra, characteristic of the particular type of iron ion under investigation, indicate that the charge radius of the Fe57 nucleus is greater in the ground state than in the first excited state. These spectral shifts, when compared to that for the iron atom, indicate that the electron density at the iron nuclei in metallic iron is equivalent to the electron configuration 3d74s1. In addition, the ferrous data clearly show pure electric

quadrupole splitting. To interpret quantitatively the data, the Sternheimer polarization factors for the ferrous ion are computed and the quadrupole moment for the first excited state of Fe57 is estimated to be 0.15 barns. A simple model is also suggested to explain the striking temperature dependence of the quadrupole splitting in the ferrous compounds. (Author)

AD-276 727 Div. 25
(TISTP/JW) OTS price $1.60

Cornell U., Ithaca, N. Y.
INVESTIGATION OF SOLID SURFACES BY FIELD EMISSION MICROSCOPY AND MASS SPECTROMETRY.
Final rept., 1 Feb 60-31 Jan 62,
by Richard C. Bradley. 1 Mar 62, 14p. 19 refs.
(Contract AF 49(638)748)
(AFOSR-2273) Unclassified report

DESCRIPTORS: *Field emission, *Electron microscopy, *Mass spectroscopy. Absorption, Electron diffraction analysis, Oxygen, Xenon, Nitrogen, Molybdenum, Platinum, Tantalum, Zirconium, Copper.

The physics of surface phenomena on metals under ultra high vacuum conditions or in controlled pure gas atmospheres of argon, xenon, oxygen and nitrogen were studied. A bakeable mass spectrometer was designed and built specifically for this purpose. An investigation was made of the mechanisms of sputtering, evaporation and desorption from molybdenum, tantalum, platinum and copper. Additional information was obtained on electron emission phenomena from zirconium and some of its alloys with the field emission microscope. (Author)

AD-276 736 Div. 25, 8
(TISTP/JW) OTS price $12.50

Electrical Engineering Research Lab., U. of Illinois, Urbana.
INTERACTION OF MICROWAVES IN GASEOUS PLASMAS IMMERSED IN MAGNETIC FIELDS,
by K. V. N. Rao and L. Goldstein. 1 Apr 62, 162p. incl. illus. 40 refs. (Scientific rept. no. 3)
(Contract AF 19(604)3481, Proj. 8653)
(AFCRL 62-489) Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, *Microwaves. Gases, Magnetic fields, Resonance, Electron bombardment, Excitation, Absorption.

The phenomenon of radio frequency electromagnetic wave interaction in gaseous plasmas is discussed. The technique of microwave interaction with a plasma and the simultaneous observation of the afterglow light intensity were employed to investigate gaseous plasmas immersed in external magnetic fields. Attention was focused on the effects produced in such plasmas when one of the simultaneously propagating microwaves is in electron-cyclotron resonance. It is demonstrated that for relatively modest amplitudes of the resonating wave the kinetic energy of the electrons increases considerably which in turn effects the electron collision frequency and the magnetic field control of the plasma confinement. The enhancement of the electronic energy caused by the cyclotron resonance absorption of microwave energy is evidenced in the propagation characteristics of resonant and non-resonant electromagnetic waves, the visible excitation light intensity of the plasma, and the emission of microwave noise power from the plasma. (Author)

AD-276 737 Div. 25, 20
(TISTM/TCG) OTS price $4.60

Naval Radiological Defense Lab., San Francisco, Calif.
PRECISION MAGNETIC FIELD MEASUREMENTS USING HALL GENERATORS,
by T. S. Dahlstrom, H. A. Howe and others.
24 Apr 62, 44p. incl. illus. tables. (Rept. no. NRDL-TR-559)
Unclassified report

DESCRIPTORS: *Semiconductors - Electrical properties, *Magnetic fields - Measurement, *Accelerators. Indium compounds, Arsenides, Antimonides, Hall effect, Generators, Electric potential, Voltage, Resistance, Resistors, Calibration, Design, Cyclotrons, Measurement.

Accelerators employing magnetic fields require accurate measurement of these fields. Employment of the Hall effect in recently developed semiconductors, indium-arsenide and indium-antimonide, meets these requirements. The semiconductors have the following approximate characteristics depending upon the size and type of semiconductor. At the rated current through the semiconductor, the Hall voltage is about 0.1 v at 10 kgauss. The temperature coefficient is small (approximately -0.07% /C) but varies as much as 50% for different magnetic fields. The long time stability is good with a measured variation over a year of less than 1 part in 10,000. Semiconductors with effective dimensions from 1 to 12 mm are available. With a special value of electrical load on the output terminals linearity better than 0.5% is obtainable from 0 to 10 kgauss. A detailed description of the temperature coefficient of the Hall potential, the internal resistance of the semiconductor, is presented along with a description of a temperature compensating network. (Author)

AD-276 738 Div. 25
(TISTP/WH) OTS price $1.60

New York U. Coll. of Engineering, N. Y.
POLARIZATION OF SUNLIGHT REFLECTED FROM THE SEA SURFACE,
by Joseph Pandolfo. Apr 62, 14p. incl. illus. tables, 6 refs.
(Contract Nonr-28503)
Unclassified report

DESCRIPTORS: *Polarization, *Colorimetric analysis. Solar spectrum, Water waves, Sea water, Light.

The observation of purple-blue solar glitter points when viewing the sea surface through polarizing glasses can be explained on the following basis. Reflection of sunlight at angles of incidence close to the Brewster angle for the long and medium wavelengths of the visible light spectrum produces a reflected beam with a component wave vibrating in the plane of incidence and deficient in red, green, and yellow light. Since this component of the reflected beam is the only one transmitted by polarizing glasses, the glitter points appear to be of a purple-blue color. Other colorimetric properties of the parallel polarized reflected light beam predicted by this explanation are consistent with the observations. The explanation may be used to obtain extreme values of sea surface slope at the time of the observation, and the extreme values obtained are consistent with previous estimates of extreme sea surface slopes. It is suggested that the type of observations described might be useful in the measurement of sea surface slope distributions over small areas. (Author)

AD-276 747 Div. 25
(TISTP/JW) OTS price $26.00

Space Technology Labs., Inc., Canoga Park, Calif.
MEASUREMENT OF TEMPERATURE, SALINITY, AND VELOCITY OF WATER THROUGH ELECTROLYTIC CONDUCTIVITY MEASUREMENTS,
by L. L. Higgins. 15 Mar 62, 1v. incl. illus. tables (Technical rept. no. 8609-0100-RU-000)
(Contract Nonr-347400, Proj. NR 062-276)
Unclassified report

DESCRIPTORS: *Physical properties, *Water. Dielectric properties, Sea water, Conductivity, Electrolysis, Temperature, Measurement, Salinity, Velocity.

A new technique is studied for the simultaneous, independent and continuous measurement of the temperature, salinity and velocity at a point in a flowing water solution by means of electrical measurements of the electrolytic conductivity and dielectric constant of the medium. The instrumentation is capable of high sensitivity and rapid response, limited only by the physical size of the probe, and small sensors are relatively easy to construct in a simple and durable configuration. The methods are applied to measurements in sea water and tap water. (Author)

AD-276 749 Div. 25, 15
(TISTP/WH) OTS price $8.60

New Mexico U. Engineering Experiment Station, Albuquerque.
DUAL RADIAL DISLOCATION,
by F. D. Ju. 15 June 62, 87p. incl. illus. 20 refs. (Rept. no. ME-4)
(Contract AF 49(638)993)
(AFOSR-847) Unclassified report

DESCRIPTORS: *Stresses, *Elasticity. Mathematical analysis, Deformation.

The generalized theory of elastic dislocation set forth by Ju (Jnl. of Appld. Mech., Paper no. 60-APM-14 1960) is applied to a dual radial-cut problem to justify the superposition theory. In addition, various dislocation relations along the cut are considered in order to make a comparison of stress field.

AD-276 803 Div. 25
(TISTP/FR) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
ON THE PROBLEM OF THE EFFECT OF ATMOSPHERE ON THE RADIATION OF AN ARC DISCHARGE. I.
(K Voprosu o Vliyanii Atmosfery No Izlucheniye Dugovogo Razryada),
by O. P. Semenova and M. V. Petrova. 8 Aug 60, 7p. 27 refs. (Trans. no. T-1499 from Izvestiya Vyschika Vchebnyka Zavedeniy Fizikia 2:71-76, 1961)
Unclassified report

DESCRIPTORS: *Electric arcs, *Atomic spectrum. Light, Argon, Nitrogen.

AD-276 839 Div. 25
(TISTP/FR) OTS price $1.60

North Carolina U., Chapel Hill.
POINT DEFECTS AND DISLOCATIONS IN SILVER CHLORIDE,
by M. N. Kabler, H. Layer and others. 1962. 9p. incl. illus. 19 refs.
(Contract AF 49(638)865)
(AFOSR-2664)
Unclassified report

DESCRIPTORS: *Silver compounds, *Chlorides, *Crystal structure. Stresses, Electrical conductance, Chemical impurities.

Three experiments on imperfections in silver chloride crystals are reviewed. (a) Studies of the strain-aging in impure crystals as a function of time, temperature, and purity establish that the dislocations are pinned by divalent impurities which migrate with an activation energy of 0.46 e.v. (b) Observations of ionic conductivity during pulsed plasticity indicate that excess silver interstitials are created with an efficiency of .0000007 fractional concentration per unit strain; these interstitials have a lifetime of one hundred million jumps. (c) Measurements of the annealing out of excess electrical conductivity of quenched crystals give the divacancy binding energy to be 0.42 e.v. and the migration energy to be 1.0 e.v. The concentration of Schottky defects at high temperatures is estimated to be approximately 0.1%. (Author)

AD-276 841 Div. 25, 15
(TISTP/WH) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON THE PROPAGATION OF STRESS WAVES IN A RATE SENSITIVE PLASTIC MEDIUM,
by P. Perzyna. June 62, 32p. incl. illus. tables, 9 refs. (Technical rept. no. 81; Rept. no. C11-81)
(Contract Nonr-56210, Proj. NR-064-406)
Unclassified report

DESCRIPTORS: *Stresses, *Plasticity. Propagation, Wave transmission, Shock waves, Impact shock, Complex variables, Differential equations.

The propagation of stress waves in rate sensitive plastic materials is treated. Four types of waves are considered, namely, spherical waves, cylindrical radial waves, cylindrical shear waves and plane waves in a half-space. It is shown that these four wave problems can be reduced to the same mathematical formulation. On the front of the propagation wave which constitutes the shock wave, the solution is given by an iteration method. In the anelastic regions the method of finite differences along the characteristic lines is used whereas in the elastic regions the problem is reduced to the generalized Picard problem for which the Riemann function is determined in a closed form, except for cylindrical radial waves. (Author)

AD-276 872 Div. 25, 6
(TISTW/EET) OTS price $3.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
REVIEW OF THE SHALLOW WATER PROPAGATION PROBLEM,
by P. A. Barakos. 13 June 62, 36p. incl. illus.
(USL rept. no. 531)
(Proj. S-F001 03 01-8121)
Unclassified report

Presented as a lecture at the U. S. Navy Underwater Sound Lab.

DESCRIPTORS: *Underwater sound transmission. Acoustics, Propagation, Attenuation, Oceans, Ocean bottom, Underwater sound, Underwater sound signals, Hydrophones, Acoustic ranges, Explosives, Sources, Underwater explosions, Oceanographic data, Water, Tests, Test methods.

A brief review of the methods used and of problems in experimentation is presented. The project Texas Tower No. 4 work is summarized.

Emphasis is placed on propagation in shallow water, but some deep water observations are included. The principal study is an analysis of sound transmission at frequencies between 89 and 1120 cps. The principal conclusion of the Texas Tower Study is that propagation depends markedly upon the temperature structure of the water, and the topographic features and slope of the bottom. For frequencies below about 250 cps propagation also depends on the geological structure of the medium immediately below the water layer. A good knowledge of the velocity structure of the upper layers of the bottom is obtained from the dispersion phenomenon, and this information is used principally as an aid in the interpretation of the propagation data. The attenuation parameter is found to be a function of water depth, frequency, and of the physical characteristics of the area. (Author)

AD-276 887 Div. 25, 4, 26
(TISTM/TCG) OTS price $1.60

Alloyd Corp., Cambridge, Mass.
A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE.
Quarterly progress rept. no. 4, 1 Feb-1 May 62, by N. W. Kirshenbaum. 1 May 62, 10p. incl. illus. 6 refs.
(Contract NOw 61-0656-c)
Unclassified report

DESCRIPTORS: *Lithium compounds, *Fluorides - Physical properties, *Crystals - Processing, *Fatigue (Mechanics). Chemical milling, Pickling, Heat treatment, Electron beams, Radiation effects, Rolling mills.

Chemical polishing of LiF crystals using HBF4 was unsatisfactory. Polishing unannealed irradiated crystals in agitated solutions of 2 to 5% NH4OH was promising. An aqueous solution of 1.5 x 10 to the -4th power M FeF3 was superior to FeCl3 as an etchant medium. Cleavage of LiF crystals at liquid N temperature apparently decreased brittleness. Cleaved crystals annealed between 350 and 500 C showed evidence of thermal etching. High voltage electron irradiation of LiF crystals produced atomistic effects similar to gamma irradiation. Irradiated crystals were cleaved with less effort and deformation than the as-received crystals. A technique for observing dislocations introduced by rolling was devised.

AD-276 906 Div. 25, 8
(TISTP/TL) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
GAS DUPLEXER (PINCH EFFECTS).
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62, by Charles S. Ward. 31 Mar 62, 9p. illus.
(Contract AF 30(602)2401)
(RADC TDR 62-254) Unclassified report

DESCRIPTORS: *Radar duplexers, *Magnetic pinch, *Magnetic fields, *Argon, *Waveguides, *Gas discharges. Waveguide windows, S band, Hydrogen, Electronic switches, Encapsulation, Conductivity, Microwaves, Plasma physics, Electric fields, Attenuation, Design, Tests, Pressure.

The discharge arc loss and recovery time of a typical S-band encapsulated window was measured as a function of transverse magnetic field for varying fill pressures of spectroscopically pure argon. These measurements were made at a peak power of 125 kilowatts, a three microsecond pulse width, and a 0.001 duty cycle. The D.C. magnetic field was placed perpendicular to the narrow sides of the waveguide and therefore perpendicular to the microwave electric field. Reductions in both discharge arc loss and recovery time were observed due to the magnetic field. A magnetic field duplexer window, using quartz cylinders, was developed. This window has the desired 7% bandwidth at 2800 Mc and the low level insertion loss was less than 0.1 db. The window will handle at least 10 megawatts peak — 10 kilowatts average under the specified duplexer conditions. (Author)

AD-276 920 Div. 25, 4, 8
(TISTM/EJH) OTS price $8.10

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept., Jan-Mar 62.
1 June 62, 88p. incl. illus.
(NAVWEPS rept. no. 7219)
Unclassified report

DESCRIPTORS: *Heat resistant polymers - Synthesis, *Phosphorus compounds, *Nitriles, *Atomic energy levels, *Argon, *Infrared spectroscopy - Atomic spectrum, *Lasers, *Transmission lines - Waveguides, *Loop antennas, *Semiconductors. Solid state physics, Germanium, Hafnium, Silicon, Polymers, Antimonides, Aluminum compounds, Gallium compounds, Polymerization.

Contents:
High temperature polymer program
  Phosphonitrile ring opening studies
  Polymerization mechanism studies
  Synthetic studies
Infrared atomic spectra
  The 4f-levels in Argon I
  The infrared spectra of Hf
  Interferometric measurements in the first spectrum of Ge
Laser program
  Theory of laser operation
  Experimental work
Nonlinear transmission lines
  Nonlinear propagation
Semiconductor physics
  Certain expansions of solutions of the confluent Heun equation
  Faraday effect observed at the absorption edge of Si, AlSb, Ge and GaSb
Small antenna study
  Two-loop superdirective end-fire antenna

AD-276 922 Div. 25
(TISTP/JW) OTS price $13.00

National Bureau of Standards, Washington, D. C.
THE CALCULATION OF THERMODYNAMIC PROPERTIES OF GASES AT HIGH TEMPERATURES,
by Harold W. Woolley. Mar 62, 183p. incl. illus. tables, 17 refs.
(Contract AF 29(601)-60-4491, Proj. 5776)
(AFSWC TDR 62-21) Unclassified report

DESCRIPTORS: *Thermodynamics. Gases, Temperature coefficient of reactivity, Interstellar matter, Ionization, Plasma physics, Electrons, Thermal diffusion.

This report includes:
EFFECTS OF INTERMOLECULAR INTERACTIONS ON THERMODYNAMIC PROPERTIES OF GASES AT HIGH TEMPERATURES AND PRESSURES, by Harold W. Woolley. 1962, 22p. incl. illus.

The calculation of thermodynamic properties of gases at high temperature using ion solution theory is analyzed in regard to various details. Earlier work based on rigid sphere ions is enlarged on briefly. An extension to a more general case of realistic pair interactions is also obtained. With Debye screened ionic interactions,

a study is made of effects of repulsions and both continuum and bound states for ionic attractions; simple approximate representations of the interaction effects for the two free particle interaction cases are given. For the bound states, the finite number of states available for occupancy as a result of Debye screening is explicitly indicated, and a numerical method to adjust from an arbitrary state sum to the ''Debye screened'' sum is explained. An extensive compensation between bound states just below the continuum and a partial state paucity within the continuum are also noted. Other details considered include the estimation of the dielectric constant up into the region of high density and high temperature, the semi-empirical estimation of nonbonding pair interactions involving neutral and ionized species, and corresponding virial-type exclusion effects. A table of second virials for constituents of air up to 20,000 K is included. (Author)

AD-276 937 Div. 25
(TISTM/EJH) OTS price $3.60

Raytheon Co., Waltham, Mass.
TEMPERATURE DEPENDENT SPECTRUM OF AN ANTIFERROELECTRIC LINEAR CHAIN MODEL.
Scientific rept. no. 4 on Investigation of the Microwave Properties of Ferroelectrics,
by B. D. Silverman. Apr 62, 31p. incl. illus. table, 27 refs. (Rept. no. S-422)
(Contract AF 19(604)8005, Proj. 4600)
(AFCRL-62-322) Unclassified report

DESCRIPTORS: *Ferroelectric materials - Dielectric properties, *Ferroelectric crystals, *Lattices. Frequency, Dielectrics, Phase transitions, Transition temperatures, Antiferroelectricity, Theory, Mathematical analysis, Temperature, Vibration, Lead compounds, Zirconates.

Some general properties of the lattice vibrational spectra of antiferroelectric perovskite materials are proposed and illustrated with the use of a simple lattice model. It is shown that the existence of a low lying optical mode which is required to explain the dielectric properties in the cubic phase, suggests that an entire transverse optical branch should be low and temperature dependent. Each frequency of this branch can be characterized by an instability temperature. The mode with the highest instability temperature is the first to become unstable as the temperature is lowered. The calculated difference due to electrostatic interactions between the transition temperature and Curie temperature is shown to be of the same order as the observed difference for these materials. (Author)

AD-276 941 Div. 25, 4
(TISTB/AW) OTS price $10.50

Stanford Research Inst., Menlo Park, Calif.
A BIBLIOGRAPHY ON SOLUTIONS AND CRYSTAL GROWTH AT HIGH TEMPERATURES AND PRESSURES,
by W. J. Silva, F. Craig and W. J. Fredericks.
9 May 62, 135p. (Scientific rept. no. 2)
(Contract AF 19(604)5697, Proj. 4608)
(AFCRL 62-332) Unclassified report

DESCRIPTORS: *Bibliography - Pressure, *Pressure, *Temperature, *Crystals, *Solutions. Growth, Materials, Measurement, Hydrostatic pressure, Plastic flow, Electrical effects, Magnetic effects, Optics, Chemical reactions, Biology, Water, Solubility, Proton transfer.

This report contains a bibliography of work related to the growth of crystals from solutions at high temperatures and pressures. References are organized into groups determined by the principal content of the paper. Each reference gives author, title, publication, and abstract reference. A cross index by author is provided. (Author)

AD-276 959 Div. 25
(TISTM/BRW) OTS price $5.60

Texas Instruments, Inc., Dallas.
INVESTIGATION OF APPLICATIONS OF SUPERCONDUCTIVITY,
by Wallace A. Kluck. 13 Apr 62, 51p. incl. illus. tables (Rept. no. 1-48901-1)
(Contract AF 30(602)2482, Proj. 4519)
(RADC TDR 62-194) Unclassified report

DESCRIPTORS: *Superconductivity. Magnetic effects, Magnetometers, Amplifiers, Galvanometers, Magnetic fields, Thermal switches, Measurement, Low temperature research, Thermoelectricity, Sensitivity.

Flux pump noise from several sources was reduced to where it represents only 33 quanta of flux. This corresponds to a magnetic field of about 10 to the -6th power oersted or to a sensitivity of 3.9 x 10 to the -10th power ampere when measurements are made using the pickup coil of the galvanometer as the input to the flux pump. The pump was used as a microvoltmeter to measure the EMF generated by a thermocouple. Experiments with magnetic shielding produced no shielding better than a Mu metal shield outside the dewar combined with a Pb superconducting can around the pump. The principal application of the flux pump appears to be in cryogenic research. A magnetic communication system using the pump as a detector seems impractical. Pumping methods using no moving parts were developed to produce large circulating currents in the dewar with only small current inputs. Current gains as high as 40 to 1 were achieved, and larger gains are possible. If superconducting materials are developed that will carry the required currents, this method could be invaluable for generating large magnetic fields. (Author)

AD-276 960 Div. 25
(TISTP/JW) OTS price $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
AN ULTRASONIC CW SPECTROMETER FOR THE INVESTIGATION OF ELECTRON SPIN-PHONON INTERACTIONS IN SOLIDS,
by D. I. Bolef, J. de Klerk, and R. B. Gosser.
16 Jan 62, 21p. illus. 23 refs. (Scientific rept. no. 1; Scientific paper no. 62-908-108-P1)
(Contract AF 19(604)8826, Proj. 4600)
(AFCRL 62-306) Unclassified report

DESCRIPTORS: *Ultrasonics, *Nuclear magnetic resonance. Acoustics, Electrons, Solids, Phonons, Nuclear spins.

A cw acoustic spectrometer operating in the frequency range of 10 to 1000 Mc is described. The acoustic probe, applicable to low temperature measurements, is characterized by its mechanical resonance properties. Several of the novel features of the spectrometer are described. The apparatus, essentially the acoustic analog of an electron paramagnetic resonance microwave transmission spectrometer, has been applied to the study of electron spin-phonon interactions in solids. (Author)

AD-276 961 Div. 25
(TISTP/JW) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LOCALIZED MODES AND SPIN-LATTICE INTERACTIONS,
by P. G. Klemens. 22 Sep 61, 15p. 6 refs.
(Scientific rept. no. 10; Scientific paper no. 908-C901-P6)
(Contract AF 19(604)5589, Proj. 5621)
(AFCRL-712) Unclassified report

DESCRIPTORS: *Nuclear spins, *Lattices. Relaxation oscillators, Paramagnetic resonance, Phonons, Relaxation time.

Localized lattice modes can contribute to the strain at a paramagnetic impurity and thus influence the spin-lattice interaction. Their contribution to the spin relaxation is estimated. It is governed by the rate with which a local mode attains equilibrium with the phonon continuum, estimated in a previous paper. Studies of the spin relaxation of paramagnetic substitutional impurities, lighter than the parent atom, should yield information about the nature of local modes. (Author)

AD-276 979 Div. 25, 7
(TISTM/EJH) OTS price $.75

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
STATE-OF-THE-ART SURVEY OF SUPERCONDUCTIVITY AND SUPERCONDUCTING ELECTROMAGNETS.
Rept. for Mar-July 61 on Applied Research in Electronic and Magnetic Materials,
by Robert A. Wolf. Feb 62, 19p. incl. illus. 19 refs.
(Proj. 7371)
(ASD TN 61-160)
Unclassified report

DESCRIPTORS: *Superconductors - Magnetic properties, *Superconductivity - Theory, *Electromagnets, *Solenoids. Materials, Ferromagnetic materials, Niobium compounds, Tin compounds, Intermetallic compounds, Magnetic fields, Electrical properties, Magnetic susceptibility, Cryogenics.

Some important characteristics and applications of superconducting materials have been compiled from a survey of existing information on the subject of superconductivity. The basic properties of superconductors are described and a brief account of the Bardeen-Cooper-Shrieffer theory is given. The previously published data on the superconducting compound Nb_3Sn (niobium-tin) are reviewed, and superconducting solenoids utilizing this material are discussed. (Author)

26. PRODUCTION AND MANAGEMENT

AD-276 537 Div. 26, 30
(TISTM/BRW) OTS price $10.10

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 3, 22 Feb-22 Apr 62,
by N. E. Sindlinger, J. A. Martin and D. F. Huttenlocher. 22 Apr 62, 116p. incl. illus. tables; 30 refs. (Rept. no. AL62T013)
(Contract NOw 61-0716-c)
Unclassified report

DESCRIPTORS: *Ball bearings, *Lubrication. Theory, Elasticity, Hydrodynamics, Deformation, Films, Electrical conductance, X-ray spectroscopy, Surfaces, Failure (Mechanics), Metals, Transport properties, Tracer studies, Test equipment, Bearings, Roller bearings, Pressure.

Experimental studies were continued with the rolling four-ball test machine using conductivity and radioactive transfer techniques. Experimental studies were also continued with a refined direct-beam X-ray method for studying oil-film thicknesses at the contact in the two-ball test machine. The review of elastohydrodynamic lubrication theory for the generation of lubricant film pressures between two rollers or balls was continued. Progress on the development of a computer technique for the interpretation of measured lubricant-induced ball contact deformations in terms of contact stresses is also reviewed. The interaction of a lubricant film with the surface geometry of typical test balls in the four-ball tester was analyzed theoretically in an effort to provide further interpretation of conductivity test data in the transition region between complete metallic contact and a complete lubricant film. A mathematical analysis of the direct-beam X-ray oil-film thickness measurement method applied to parallel flats has been conducted as the first stage of a comprehensive analysis to predict the linearity of the direct-beam method in the actual loaded two-ball test configuration. (Author)

AD-276 556 Div. 26
(TISTE/CAM) OTS price $8.60

Aeronutronic, Newport Beach, Calif.
DESIGN, DEVELOPMENT AND TESTING OF NON-MODULATING PRESSURE CONTROL VALVES. VOLUME III,
by W. Hobbs and W. Kaufman. Dec 61, 100p. incl. illus.
(Contract AF 04(647)429; In cooperation with Frebank Co., Glendale, Calif.)
(AFBSD TR 61-71, vol. 3)
Unclassified report

DESCRIPTORS: *Safety valves, *Control valves, *Gas valves, *Pressure regulators. Design, Specifications, Analysis, Pressure, Time, Hydraulic actuators, Differential equations, Equations of state, Hysteresis, Springs, Modulation, Tests, Test methods.

A pressure regulator was analyzed. The regulator, designed to operate as an on-off device, tended toward proportional pressure control when subjected to certain inlet pressures and flow demands. As an on-off device, the regulator duty cycle was determined by inlet pressure and flow demand. Setting of the pressure dead-band influenced the frequency of limit-cycle operation. For purposes of analysis the regulator was considered as a lumped-parameter device and described mathematically by a linear set of differential equations and constraint equations. The static stability of the regulator (normally unstable for on-off operation) was investigated over the dynamic range of inlet pressures and found to be stable over a very limited region of operation. Although the pressure regulator functioned normally in a limit-cycle mode of closed-loop operation, under specific conditions the regulator approached this stable region and performed as a proportional regulator. (Author)

AD-276 584 Div. 26, 14
(TISTM/BRW) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
SPHERE GRINDING AND POLISHING TECHNIQUES,
by Edward T. Hooper. 21 Mar 62, 10p. incl. illus. table, 6 refs. (Rept. no. NOLTR 62-42)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials - Processing, *Spheres, *Garnet. Masers, Production, Abrasion, Grinders, Single crystals, Yttrium compounds, Iron compounds, Microwave amplifiers.

Several methods for the grinding and polishing of hard materials such as yttrium-iron garnet are discussed. Those methods which have been attempted in preparing samples for the study of solid state ferromagnetic microwave amplifiers are outlined to show the development of a final and successful semi-automatic machine method. (Author)

AD-276 882 Div. 26, 17
(TISTM/BRW) OTS price $8.10

Cincinnati Milling Machine Co., Ohio.
HIGH TEMPERATURE MACHINING METHODS.
Technical engineering rept. 21 Aug 61-21 Feb 62, on Phase 3,
by Jens L. Wennberg and Clarence L. Mehl.
21 Feb 62, 80p. incl. illus. tables.
(Contract AF 33(600)40066)
(ASD TR 7-704, vol. 6)
Unclassified report

DESCRIPTORS: *Heat resistant alloys - Machining. High temperature research, Machine tools, Milling machines, Heating, Steel, Stainless steel, Nickel alloys, Airframes, Lathes, Grinders, Cutting tools, Resistance, Radiofrequency, Costs, Machine shop practice.

Hot machining can reduce the cost of manufacturing parts from heat treated 4340 and Ph 15-7 Mo steels up to 36% when compared to conventional machining. The cost of machining a heat treated 4340 main landing gear truck pivot was reduced from $24.85 to $18.69 and the cost of milling a Ph 15-7 Mo extrusion was reduced from $2.00 per foot to $1.27 per foot when elevated temperature machining was applied. Rene' 41 does not respond to hot machining when workpieces greater than 2" wide are face milled. (Author)

AD-276 938 Div. 26
(TISTP/FR) OTS price $4.60

Signal Corps, Washington, D. C.
PROJECT COMET: A PROJECT TO DEVELOP A COMPUTER OPERATED MANAGEMENT EVALUATION TECHNIQUE.
Rept. on A Signal Corps Concept for Multi-Project Management,
by William K. Kreamer. May 62, 44p. incl. illus.
Unclassified report

DESCRIPTORS: *Management engineering, *Government procurement, *Army operations. Scheduling, Digital computers.

A management information system and evaluation technique has been designed for the U. S. Army Signal Corps in planning, scheduling, and monitoring the acquisition of communications-electronic equipments. The technique is designed to be a response to the general problem of project or systems management across functionally oriented field operating agencies. One of its primary objectives is to provide data, in varying detail and format, for use at all levels of management--at local operating levels as well as at command levels. (Author)

AD-276 962 Div. 26
(TISTB/AW) OTS price $.50

Watertown Arsenal Research and Development Div., Mass.
A BIBLIOGRAPHY OF REPORTS ON SANDWICH CONSTRUCTION FOR ORDNANCE DESIGN ENGINEERS,
by Michael H. Matigian. Apr 62, 12p. (Technical rept. no. WARD TR 925/1)
(Proj. 517-01-022)
Unclassified report

DESCRIPTORS: *Bibliography - Sandwich construction, *Sandwich construction. Honeycomb cores, Design, Aircraft, Materials, Aluminum.

A bibliography of reports on sandwich construction is presented for general use by ordnance design engineers interested in lightweight ordnance materiel. (Author)

AD-276 992 Div. 26, 17
(TISTM/BRW) OTS price $11.50

Chance Vought Corp., Dallas, Tex.
SHEET METAL FORMING TECHNOLOGY.
Interim technical engineering rept. no. 2, 1 Feb-31 May 62,
by W. W. Wood, R. E. Goforth and others.
May 62, 46p. incl. illus. tables, 4 refs.
(Contract AF 33(657)7314)
(ASD TR 7-871, vol. 2)
Unclassified report

DESCRIPTORS: *Metals - Processing, *Sheets. Metal plates, Pipes, Disks, Deformation, Tensile properties, Velocity, Pressure, Explosive forming, Metal forming presses, Hydraulic presses, Hydrostatic pressure, Electromagnetism, Heat, Cobalt alloys, Alloys, High temperature research, Aluminum alloys, Stainless steel, Titanium alloys, Chromium alloys, Vanadium alloys, Beryllium, Tool steel, Nickel alloys, Molybdenum alloys, Niobium alloys, Tungsten.

Tensile tests were performed on longitudinal specimens of various gage lengths at temperatures to 2000 F and velocities to 575 ft/sec. Free bulging of tubes and discs were tested at varying velocities from static to 800 ft/sec. utilizing high and low explosives, the former in water and the latter in air. Critical speeds were found for the longitudinal specimens resulting in considerable loss in ductility at the higher speeds. No criticals were found for the tubular specimens. For all the alloys tested, the ductility is at least maintained at the higher velocities and, in some cases, is increased considerably. Experimental work was conducted in high pressure rubber forming to pressures of 50,000 psi with considerable increases in formability. Free forming radius, minimum flange, and shrink flange formability have been increased at each incremental increase of pressure. Critical pressures have been found beyond which forming cannot be improved appreciably. (Author)

27. PROPULSION SYSTEMS

AD-276 529 Div. 27, 17
(TISTM/BRW) OTS price $2.60

Republic Aviation Corp., Mineola, N. Y.
EVALUATION OF HIGH-STRENGTH LIGHTWEIGHT LAMINATED PRESSURE VESSELS OF LAP-JOINT CONSTRUCTION.
Quarterly progress rept. no. 1, 1 Dec 61-28 Feb 62,
by R. E. Stegler. 1 May 62, 28p. incl. illus. tables (Rept. no. RAC 789; MSD 244-3001)
(Contract DA 30-069-ORD-3440, Proj. 59332008)
(WAL TR 766.2/3) Unclassified report

DESCRIPTORS: *Rocket cases, *Pressure vessels. Manufacturing methods, Steel, Adhesives, Bonding, Brazing, Welding, Sheets, Solid rocket propellants, Rocket motors, Design, Metal joints, Nickel alloys.

Studies were initiated to demonstrate the high performance capabilities of an overlapping cylinder design and manufacturing techniques for application to solid propellant rocket motor cases utilizing structural adhesive bonding (phase I) and alternately brazing or ceramic bonding (phase II) to effect the assembly. A further aim is to evaluate the use of cylinders produced by welding sheet material both in the interest of production economy and of potential application to very large sizes. For this latter purpose, the high nickel mar-aging steels are being surveyed as the preferred material. The effort on a materials survey resulted in a tentative selection of the 18% Ni alloys as offering the greatest potential. Small quantities of sample materials were partially evaluated and produced results sufficiently encouraging to warrant ordering test quantities of both the 18-7-5 and 18-9-5 NiCoMo mar-aging steel alloys. Basic weldability characteristics were excellent, although optimum processing techniques have yet to be determined. The potential of these alloys at 300,000-psi yield parent-metal strength levels was confirmed, and preliminary tests indicate satisfactory adhesive bonding characteristics. (Author)

AD-276 642 Div. 27, 10
(TISTA/SEB) OTS price $10.10

Lockheed Propulsion Co., Redlands, Calif.
FEASIBILITY DEMONSTRATION OF LARGE SEGMENTED SOLID PROPELLANT ROCKET MOTOR WITH DUAL TVC SYSTEM AND THERMAL GRAIN STRUCTURAL ANALYSIS.
Quarterly technical note no. 2, vol. 2, 1 Mar-31 May 62,
by J. W. Jones. 12 June 62, 124p. incl. illus. table, 4 refs. (Rept. nos. 577 and 578-TN-2, vol. 2)
(Contract AF 04(611)8013)
(AFBMD TN 62-2, vol. 2)
Unclassified report

DESCRIPTORS: *Rocket motors - Solid rocket propellants, *Propellant grains - Elasticity. Physical properties, Temperature, Time, Viscosity, Photoelasticity, Thermal stresses, Loading, Configurations, Epoxides, Theory, Mathematical prediction, Equations, Plasticizers, Surface temperatures, Surface properties.

An engineering approximation and confirmatory experiments to the correct theoretical temperature distribution in a propellant grain are given. The limit elastic solutions to several thermal stress problems are presented. Experimental results of cyclic thermal inputs to a uniaxial, end-constrained bar are presented. A comprehensive discussion of theory and experiment relative to the time-temperature shift phenomena is presented. In a preliminary investigation into the photoviscoelastic properties of plasticized epoxy, uniaxial strain was obtained as a function of stress, time, and temperature under dead weight loading. A comparison was obtained between plasticized and unplasticized epoxy in four-point star grain configurations under transient temperature in restraining cases. Two general approximate methods of analysis for the viscoelastic material with temperature-dependent properties under transient temperature fields are given. The methods are demonstrated using a known flat plate solution for comparison and a case-bonded propellant grain. (Author)

AD-276 662 Div. 27, 9
(TISTA/SEB) OTS price $3.60

Naval Research Lab., Washington, D. C.
NUMERICAL METHOD FOR DETERMINING THERMAL STRESSES INVOLVING PLASTIC FLOW,
by I. Vigness and E. W. Clements. 24 May 62, 37p. incl. illus. tables, 5 refs. (NRL rept. no. 5765)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles - Thermal stresses, Temperature, Surface temperature, Heat transfer, Exhaust gases, Gas flow, Theory, Mathematical prediction, Equations, Plastic flow, Tungsten.

Simple approximate methods for determining thermal stresses in nozzles are developed. The mathematical derivation assumes that a section of nozzle can be considered as a flat slab, with a condition of no bending distortion imposed. One surface of the slab is assumed to experience a temperature rise in an exponential manner; no heat loss is assumed to take place from any surface. Thermal properties are assumed to be independent of conditions of stress, and thermal diffusivity is assumed independent of temperature. Stresses are calculated for four cases: I. Constant elastic modulus. II. Modulus as a function of temperature but constant at any given temperature. III. Perfect elastic-plastic material with modulus and flow stress as a function of temperature; reversal of stress induced strains not accounted for. IV. A general condition of perfect elastic-plastic material with strain reversals permitted. A numerical example is given for the derivation of the stress distribution by the method of case IV. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-276 592 Div. 28
(TISTB/AW) OTS price $5.60

System Development Corp., Santa Monica, Calif.
AUTOMATED LEARNING PROCESS (ALP),
by Beatrice K. Rome and Sydney C. Rome.
13 Apr 62, 52p. incl. illus. tables (Rept. no. SP-785)
Unclassified report

Presented at the Sixteenth Fall Meeting of the Middle Atlantic States Philosophy of Education Society, 18 November 1961, at Queens College of the City University of New York.

DESCRIPTORS: *Training devices, *Education. Students, Universities, Learning, Automation, Design, Theory, Digital computers.

A plan for modeling a real college or school system on a digital computer is described. ALP implicitly represents a theory of learning. Automation of the learning process on a digital computer carries theoretic implications, and compels educators to consider the dynamics of education in terms of the basic, universal elements in learning and their interaction. The model allows the experimenter to treat any of these universal elements or variables as dependent or independent. It should yield new understanding of the learning process and predictive control. Should the model be deficient or inadequate, it would serve to generate novel approaches and hypotheses. (Author)

AD-276 622 Div. 28, 23
(TISTB/AW) OTS price $2.60

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
DEVELOPMENT OF ACB AUTOMOTIVE INFORMATION AND CLERICAL SPEED TESTS, FORMS 3 AND 4,
by William H. Helme, Warren R. Graham, and Alan A. Anderson. Mar 62, 20p. incl. tables, 16 refs. (Technical research rept. no. 1122)
(DA Proj. OJ 95-60-001)
Unclassified report

DESCRIPTORS: *Aptitude tests, *Achievement tests. Reliability, Standardization, Classification, Design, Military personnel, Maintenance personnel.

Experimental forms of two Army Classification Battery tests, the Automotive Information Test and the Army Clerical Speed Test were constructed, then administered along with the original operational forms to a sample of 728 men from enlisted input during September 1960. The new Automotive Information Test (Forms AI-3 and AI-4) was found to be a satisfactory replacement for AI-1 and AI-2 in that it had sufficient reliability, was similar to prior operational tests, and was well differentiated from the ACB Verbal measure. The Army Clerical Speed Test (Forms ACS-3 and ACS-4) was also found to be a reliable measure of clerical aptitude, in spite of substantial reduction in length. In January 1962, the new forms of AI and ACS were introduced operationally, replacing the prior forms as component tests of the Army Classification Battery. The shortened form of the ACS resulted in an estimated saving of one-third the cost of scoring the test, and more important, has eliminated a source of error which had been noted in the scoring of ACS-1 and ACS-2, namely, occasional failure to score the third page of the three-page answer sheet required. (Author)

AD-276 667 Div. 28, 15
(TISTB/MS) OTS price $6.60

Office of Naval Research, Washington, D. C.
SYMPOSIUM ON RESEARCH AND TEACHING METHODS IN MULTIVARIATE EXPERIMENTAL DESIGN, FORT WORTH, TEXAS, NOVEMBER 16 AND 17, 1961.
Mar 62, 68p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Symposia - Education, *Behavior - Tests, *Personality - Test methods, *Factor analysis. Statistical analysis, Analysis of variance, Adjustment (Psychology).

AD-276 698 Div. 28
(TISTB/MS) OTS price $1.60

Institute for Behavioral Research, U. of Maryland, College Park.
THE USE OF TRACKING TASKS AS INDICATORS OF STRESS.
Annual progress rept., Nov 61-Jan 62,
by Norman K. Walker and Charles J. Fricker.
Jan 62, 9p. illus.
(Contract DA 49-193-md-2208)
Unclassified report

DESCRIPTORS: *Tracking - Test methods, *Behavior - Tests. Stress (Psychology), Stress (Physiology), Mental fatigue, Errors, Man.

This is the first progress report on a pilot study to determine whether certain tracking tasks can be used as accurate indicators of the stresses on human beings. It was found that if a human operator is asked to return an indicator to a fixed position by moving a control stick, the indicator deflection being, for instance, the second integral of the control stick displacement, then the response is a continuous oscillation about the null position. The error can only be due to the man himself, and under suitable conditions will be in fixed ratio to the stick input. It is known that stress will cause degradation of operator performance so stresses can be directly compared numerically by comparing error ratios. Analog computation equipment has been assembled which gives a direct readout of the mean modular error, and great care was taken to eliminate drift and zero errors. Preliminary experiments are described which show the effects of alcohol, of long continuous runs and of fatigue. Results show that the equipment is effective and simple to use, that most persons have similar errors, that abnormal people are easily detected, and that the stresses listed do cause noticeable changes in performance. (Author)

AD-276 702 Div. 28, 23
(TISTB/AW) OTS price $1.60

Institute for Social Research, U. of Michigan, Ann Arbor.
SELF-ESTEEM AND THE DIFFUSION OF LEADERSHIP STYLE,
by David G. Bowers. Mar 62, 18p. 10 refs.
(Contract AF 49(638)1032)
(AFOSR-2555) Unclassified report

DESCRIPTORS: *Industrial psychology, *Leadership. Employee relations, Group dynamics, Personality, Reasoning.

This study suggests that conflicting evidence concerning leadership climate may be reconciled by postulating intervening cognitive processes. One such cognitive process, the self-esteem of the lower-level supervisor, is studied in the context of an organization in which no formal human relations training had taken place. A series of hypotheses relate supportiveness of the foreman's supervisor to the foreman's self-esteem, and its attendant consequences, and the latter to the foreman's behavior toward his subordinates. All hypotheses are confirmed and lend strong support to the proposition that evidence for leadership climate can be obtained ordinarily only by taking into account the motivational and cognitive structures which exist at the levels of organization being studied. (Author)

AD-276 827 Div. 28
(TISTB/MS) OTS price $1.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
APPROACHES TO THE ANALYSIS OF SOCIOMETRIC DATA. A SURVEY OF THE LITERATURE,
by Winton H. Manning and F. W. Wicker. Aug 61, 52p. 71 refs. (Rept. no. AAL TR 61-18)
(Proj. no. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Group dynamics, *Bibliography - Sociometrics, *Data - Analysis. Test methods.

AD-276 828 Div. 28
(TISTB/MS) OTS price $1.75

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. II.

DIMENSIONS OF GROUP STRUCTURE AND GROUP BEHAVIOR, by S. B. Sells. Oct 61, 56p. (Rept. no. AAL-TR-61-20)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Group dynamics, *Behavior, *Bibliography - Adjustment (Psychology). Stress (Psychology), Stress (Physiology), Sensory deprivation, Personality, Needs, Military personnel, Sociology, Measurement, Sociometrics.

Abstracts of studies on measurable dimensions of group structure and their relations to group behavior are presented. It is organized in 10 sections: (1) General Studies and Reviews, (2) Autonomy, (3) Clarity of Goals and of Roles, (4) Cohesiveness, (5) Control of Behavior of Group Members, (6) Homogeneity of Memberships, (7) Participation in Group Activities, (8) Potency of Group to Its Members, (9) Size of Group, and (10) Status Hierarchy and Stratification. (Author)

AD-276 829 Div. 28
(TISTB/MS) OTS price $2.75

Arctic Aeromedical Lab., Fort Wainwright, Alaska. MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY,
by S. B. Sells. Oct 61, 119p. (Rept. no. AAL TR 61-21)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth)
Unclassified report

DESCRIPTORS: *Group dynamics, *Behavior, *Stress (Psychology), *Stress (Physiology), *Ecology, *Bibliography - Adjustment (Psychology). Military personnel, Sensory deprivation, Climatic factors, Arctic regions.

AD-276 830 Div. 28
(TISTB/MS) OTS price $1.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska. MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. IV. ORGANIZATIONAL STAFFING,
by S. B. Sells. Oct 61, 51p. (Rept. no. AAL TR 61-22)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth)
Unclassified report

DESCRIPTORS: *Group dynamics, *Leadership, *Behavior, *Attitudes, *Management engineering, *Bibliography - Selection. Military personnel, Office personnel, Stress (Psychology), Sensory deprivation, Climatic factors, Arctic regions, Military organizations.

AD-276 831 Div. 28
(TISTB/MS) OTS price $2.25

Arctic Aeromedical Lab., Fort Wainwright, Alaska. MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. V. ORGANIZATIONAL MANAGEMENT AND LEADERSHIP,
by S. B. Sells. Oct 61, 84p. (Rept. no. AAL TR 61-23)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth)
Unclassified report

DESCRIPTORS: *Group dynamics, *Leadership, *Behavior, *Management engineering, *Bibliography - Military organizations. Military personnel, Stress (Psychology), Sensory deprivation, Climatic factors, Arctic regions.

AD-276 832 Div. 28
(TISTB/MS) OTS price $2.00

Arctic Aeromedical Lab., Fort Wainwright, Alaska. MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. VI. LEADERSHIP IN FORMAL GROUPS,
by S. B. Sells. Oct 61, 73p. (Rept. no. AAL TR 61-24)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth)
Unclassified report

DESCRIPTORS: *Group dynamics, *Bibliography - Adjustment (Psychology), *Leadership. Stress (Psychology), Stress (Physiology), Sensory deprivation.

AD-276 858 Div. 28, 32
(TISTB/MS) OTS price $3.60

Human Sciences Research, Inc., Arlington, Va. SYSTEMS OF INFORMATION IN SMALL GROUP RESEARCH STUDIES,
by Joseph E. McGrath. Apr 62, 28p. incl. illus. tables, 24 refs. (Rept. no. HSR-TN-62/2-Gn; Technical rept. no. 7)
(Contract AF 49(638)256)
(AFOSR-2416) Unclassified report

DESCRIPTORS: *Group dynamics - Documentation, *Classification - Literature. Scientific reports, Indexes, Data, Collecting methods, Behavior.

Results clearly support the validity of the classification system for systematic organization of small group research information. The findings suggest that the small group literature contains six relatively distinct systems of information, namely: (1) structural characteristics of group members; (2) dynamic characteristics of members; (3) structural properties of the group itself; (4) behavioral or dynamic properties of the group; (5) structural characteristics of the group's environment; and (6) environmental processes. The findings of the validation study indicate that variables within each of these six subsystems show consistent interrelationships, while relatively few significant relationships hold between variables from different subsystems. (Author)

AD-276 860 Div. 28, 32
(TISTB/MS) OTS price $11.60

Human Sciences Research, Inc., Arlington, Va. A SUMMARY OF SMALL GROUP RESEARCH STUDIES,
by Joseph E. McGrath. June 62, 1v. refs.
(Technical rept. no. 8; Rept. no. HSR-TN-62/3-Gn)
(Contract AF 49(638)256)
(AFOSR-2709) Unclassified report

DESCRIPTORS: *Group dynamics - Documentation, *Classification - Literature. Scientific reports, Indexes, Data, Collecting methods.

AD-276 904 Div. 28, 6
(TISTW/DLW) OTS price $2.60

Mitre Corp., Bedford, Mass.
TARGET ACQUISITION AND TRACKING IN THREE DIMENSIONS USING A TWO-DIMENSIONAL DISPLAY SURFACE,
by Charles S. Morrill and Barbara L. Davies.
Jan 61, 25p. incl. illus. tables, 9 refs.
(Technical series rept. no. 5)
(Contract AF 33(600)39852, Proj. 750)
(ESD TDR 62-49) Unclassified report

DESCRIPTORS: *Display systems - Control systems, *Three dimensional display systems, *Target position indicators, *Radar tracking, *Human engineering. Control, Control knobs, Control sticks, Electric trigger controls, Tests, Statistical analysis.

The effects are analyzed of two internally compatible and two internally incompatible display-control systems upon operator performance during target-acquisition and target-tracking tasks using three dimensions of information presented on a two-dimensional display surface. Four groups of 10 subjects each were used. Each subject performed two tasks: (1) acquiring lock-on to the target, and (2) tracking a moving target in azimuth, range, and elevation. During Task I two measures were recorded: (1) time to acquire lock-on, and (2) composite initial reversals. During Task II lock-on time and length of time of coincidence in each of the three dimensions of azimuth, range, and elevation were measured. Various statistical analyses were carried out on the data obtained from these measures. Conclusions based on these analyses are presented. (Author)

AD-276 930 Div. 28
(TISTB/MS) OTS price $13.00

Princeton U., N. J.
DIMENSIONS OF RESPONSE CONSISTENCY IN PAIRED COMPARISONS.
Doctoral thesis,
by Robert Sadacca. May 62, 189p. incl. illus. tables, 134 refs.
(Contract Nonr-185815, Proj. NR 150-088)
Unclassified report

DESCRIPTORS: *Personality - Measurement, *Personality tests - Reliability, *Perception - Tests, *Factor analysis. Reaction (Psychology).

The structure of individual differences in self-inconsistency was explored using as the basic measure of inconsistency the number of circular triads made in choosing between stimulus pairs presented in paired comparison schedules. Twelve paired comparison schedules were constructed--six called for judgments of similarity, six for judgments of preference. Three different kinds of stimuli were used in the schedules--colors, verbal material, and designs or figures. It was hypothesized that factor analyses of circular triad scores obtained for the 12 schedules would yield a general inconsistency factor and, possibly, additional factors reflecting the types of judgment and the kinds of stimuli involved. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-276 838 Div. 29
(TISTB/AW) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
APPARENT THERMAL DIFFUSIVITY OF COMPOSITE FABRIC LAYERS,
by Francis W. Botsch, James J. Powers, and Michael J. Sacco. July 61, 15p. incl. illus. tables, 7 refs. (Technical rept. no. EP-159)
Unclassified report

DESCRIPTORS: *Textiles. Composite materials, Thermal conductivity, Heat transfer, Mathematical analysis, Clothing.

A mathematical derivation of an apparent thermal diffusivity for a generalized composite fabric system consisting of different cloth layers is presented to provide a parameter for analysis of unidimensional heat flow in a clothing system. An experimental method is described for obtaining the apparent thermal diffusivity as a general solution to Fourier's Conduction Equation, using a boundary step change on a semi-infinite solid composed of dissimilar fabric layers. Also presented are several specific examples of transient heat flow in dual layer systems. The apparent diffusivities of each system are obtained both theoretically and experimentally, and the results compared graphically. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-276 510 Div. 30, 5
(TISTW/RD) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
A BALLISTICS RANGE STATION IDENTIFICATION SYSTEM TO BE USED IN CONJUNCTION WITH A DATA RECORDER-REPRODUCER,
by R. C. Folz. May 62, 6p. illus. (Rept. no. NOLTR 61-135; Ballistics Research rept. no. 55)
Unclassified report

DESCRIPTORS: *Test facilities - Ballistics, *Sound reproduction systems, *Ballistics. Recording systems, Recording devices, Time interval counters, Digital recording systems.

A ballistics range station identification system has been designed and constructed that provides a unique correlation of a series of elapsed time measurements as recorded by a data recorder-reproducer, with their respective sources. The final data readout is presented in a visual manner and is also automatically printed out by a Flexowriter. The identifying information is presented with the elapsed time data for each measurement that was recorded. (Author)

AD-276 533 Div. 30, 15
(TISTP/DAW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, INTELLIGENT MACHINES, AND SELF-ORGANIZING SYSTEMS,
by Richard Bellman. June 62, 15p. 13 refs.
(Memo. no. RM-3173-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Operations research. Cybernetics, Documentation, Theory, Computers, Research program administration.

Aspects of problem formulation and problem solution are discussed. In particular, the relevance of these matters to the field of intelligent machines and some connections with the theory and application of dynamic programming are treated. The practical application of scientific philosophy as a technique to guide research and to avoid undue waste of time, energy, and talent is developed. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-276 568 Div. 30
(TISTA/SEB) OTS price $4.60

Air Force Office of Scientific Research, Washington, D. C.
STUDY ON STRUCTURAL FEASIBILITY OF FLYWHEEL ACCELERATOR,
by Raymond F. Askew. May 62, 32p. incl. illus. (AFOSR/DRA-62-5)
(In cooperation with Auburn U., Ala.)
Unclassified report

DESCRIPTORS: *Accelerators - Flywheels, *Space environmental conditions - Equipment. Design, Stresses, Simulation, Acceleration, Centrifugal fields, Feasibility studies.

To determine the structural feasibility of a flywheel accelerator, this study was divided into three basic phases. First, the system was analyzed and configured to determine that satisfactory operation is present for all operational conditions. Second, a stress analysis was conducted to determine the influence of the centrifugal forces on the spokes and the rims of accelerator. The stress analysis considers the use of materials in the spokes and in the rim for the optimization of the weight distribution in the accelerator. Finally, an energy consideration was made for the determination of the power requirements. The equations derived in the third phase combined with the results of the second phase will enable the designer of a flywheel accelerator to meet all operational requirements. (Author)

AD-276 574 Div. 30
(TISTP/WH) OTS price $11.50

Computation Center, Mass. Inst. of Tech., Cambridge.
RESEARCH AND EDUCATIONAL ACTIVITIES IN MACHINE COMPUTATION BY THE COOPERATING COLLEGES OF NEW ENGLAND.
Progress rept. no. 10.
Jan 62, 150p. incl. illus. tables.
(Contract Nonr-184169)
Unclassified report

DESCRIPTORS: *Computers. Scientific research, Mathematical computer data, Operation, Programming.

Contents:
Research activities
Educational activities
Report of the operations staff
Activity of current computer problems
Computer and associated equipment
Publications of the center
Participants in the activities of the computation center

AD-276 582 Div. 30, 7
(TISTE/CDM) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
SWITCH CHATTER MONITORING DEVICE,
by Ronald M. Joseph. 2 Mar 62, 15p. incl. illus. tables (Rept. no. NOLTR 62-28)
Unclassified report

DESCRIPTORS: *Electric switches - Vibration, *Monitors, *Test sets. Theory, Tests, Guided missiles, Underwater to surface.

A description is given of a switch chatter monitoring device that is used to determine whether or not a switch chatters for longer than a specified period of time. The system was designed primarily for time durations of 40 and 50 microseconds, but is also capable of time durations up to and including 120 milliseconds. The device was successfully tested using a mechanical and an electrical switch. (Author)

AD-276 588 Div. 30, 13
(TISTA/VGW) OTS price $1.10

Institute of Radio Engineers, Inc., New York.
1962 PROCEEDINGS. NATIONAL AEROSPACE ELECTRONICS CONFERENCE, MAY 14, 15, 16, 1962, DAYTON, OHIO.
1962, 8p. incl. illus. 15 refs.
Unclassified report

DESCRIPTORS: *Extraterrestrial bases - Moon, *Moon - Research program administration. Industrial plants, Structures, Construction, Feasibility studies, Conferences, Economics, Management engineering, Costs.

The successful exploitation of the lunar complex will depend in a large measure on the ability of the entrepreneur to seek and develop the natural resources with a minimum expenditure of energy. Therefore, it is desirable to look critically at the selection of lunar sites which will satisfy most of the requirements such as the design of temporary structures which will enable man to initially withstand the hostile lunar environment, yet be strategically located to the natural resources with safe spaceport access corridors. The theme of this paper is orientated to investigating these aspects and the probability of success in the economic and technical senses. (Author)

AD-276 591 Div. 30
(TISTP/FR) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SIMPAC: TOWARD A GENERAL SIMULATION CAPABILITY,
by M. R. Lackner. 18 Aug 61, 30p. incl. illus. (Rept. no. SP-367)
Unclassified report

DESCRIPTORS: *Simulation, *Digital systems, *Management engineering. Digital computers, Programming.

An introductory discussion of digital simulation, which outlines problems involved in modeling and implementation is given. A discussion of SIMPAC, describing the modeling and simulation techniques employed and their application, is also provided. (Author)

AD-276 593 Div. 30
(TISTP/FR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
PARALLEL COMPUTING WITH VERTICAL DATA,
by William Shooman. 11 Jan 61, 17p. incl. illus. (Rept. no. SP-229)
Unclassified report

DESCRIPTORS: *Data processing systems. Digital computers, Programming, Algebras.

A novel technique called Vertical Data Processing (VDP) for the manipulation of data in digital computers is presented. Multiple data are processed simultaneously, one bit at a time, using Boolean operations. Many classes of problems appear adaptable to this technique. A hypothetical VDP computer which embodies both VDP and conventional techniques is proposed and its advantages are discussed. (Author)

AD-276 594 Div. 30
(TISTP/FR) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SIMPAC: A RESEARCH TOOL FOR SIMULATION,
by M. R. Lackner. 13 Mar 61, 23p. incl. illus. 7 refs. (Rept. no. SP-228)
Unclassified report

DESCRIPTORS: *Simulation, *Digital systems, *Management engineering. Digital computers, Programming.

SIMPAC is a research tool designed for the implementation of system simulation. SIMPAC provides a macro language, for constructing a model, and a computer program which will move the model through time. The program produces output descriptive of the operation of the system. The class of systems susceptible to simulation with SIMPAC is one which can be adequately modeled as a queue-server network. The network may be complex; the queues may be subject to dynamic queue disciplines; the servers may have dynamic capacities; and the individual members of queues, referred to in this paper as transactions, may be identifiable. (Author)

AD-276 692 Div. 30, 2, 22
(TISTM/BRW) OTS price $2.60

Varian Associates, Palo Alto, Calif.
ROCKET-BORNE MAGNETOMETER.
Final rept.,
by Robert Morris. Jan 62, 21p. incl. illus.
(Engineering rept. no. 270-1F)
(Contract AF 29(601)2599, Proj. 7811)
(AFSWC TDR 62-25) Unclassified report

DESCRIPTORS: *Magnetometers. Rubidium, Vapors, Theory, Design, Operation, Isotopes, Magnetic fields, Measurement, Rockets, Airborne.

A summation of the theory, design, and successful operation of two rocket-borne, wide-range rubidium-vapor magnetometers is presented. Each dual-gas-cell instrument will operate continuously in ambient magnetic fields ranging in intensity from less than 100 to more than 54,000 gammas. The constant-amplitude output signal varies in frequency directly with ambient field strength. Sensitivity is dependent upon the rubidium isotope employed. One magnetometer provides 6.99 cps/gamma, the other 4.67 cps/gamma. Self-oscillation has been achieved in fields greater than 1 oersted (100,000 gammas). Each instrument responds instantaneously (within limits of experimental error) to a step change in field intensity of several hundred gammas occurring in less than one microsecond. (Author)

AD-276 703 Div. 30
(TISTP/TL) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMPUTER SIMULATIONS OF A PERCEPTUAL LEARNING MODEL FOR SENSORY PATTERN RECOGNITION, CONCEPT FORMATION, AND SYMBOL TRANSFORMATION,
by Charles Vossler and Leonard Uhr. 8 Mar 62, 14p. incl. illus. tables, 10 refs. (Rept. no. SP-562)
Unclassified report

Presented to the International Federation of Information Processing Societies Congress, August 1962, Munich, Germany.

DESCRIPTORS: *Computers, *Simulation, *Learning. Language, Translations, Visual perception.

AD-276 704 Div. 30, 8
(TISTE/CDM) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
AN AUTOMATIC LINE FOR MEASUREMENT OF THE REFLECTION FACTOR IN A K-BAND,
by L. V. Kasatkin and N. L. Posen. Jan 62, 6p. incl. illus. (Trans. no. ETR 61-18 of Universities' Bulletin. Radio Technology 4:354-356, 1961)
(Contract AF 19(604)8505)
Unclassified report

DESCRIPTORS: *Standing wave indicators, *Microwave probes, *Test sets. Oscilloscopes, K band, Measurement, Automatic, Instrumentation, Impedance matching, Transmission lines, Waveguides, USSR, Design.

A description is given of an automatic measuring instrument to determine, with an accuracy of + or - 10%, the frequency responses of mismatching in the interval of frequencies from 20%. In the process of carrying out band measurements, there is no need for tuning any elements of the high-frequency system instrument. The pattern of the standing wave in the waveguide is indicated on the oscilloscope of the instrument. Automatic measurements of the reflection factor considerably relieve the process of matching different waveguide couplings. While the requirements for the accuracy of measurement of K-band factor are not great, the simplicity of measurement and the rate of analysis of the frequency dependencies of the reflection factor on the waveguide coupling under examination are important. (Author)

AD-276 715 Div. 30, 6
(TISTW/DLW) OTS price $13.00

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
AN INVESTIGATION OF ANALOGUE AIDS FOR MOBILE RAPCON CONTROLLERS.
Final rept.,
by Tirey K. Vickers and Darrell E. Seasor.
Jan 62, 185p. incl. illus. tables.
(Contract AF 19(604)8452, Proj. 2124)
(AFCRL 62-152) Unclassified report

DESCRIPTORS: *Air traffic control systems - Data processing systems, *Analog computer - Air control centers, *Landing - Scheduling, *Ground controlled approach radar. Computers, Mobile, Air traffic, Approach indicators.

A design study was directed toward the introduction of simple, lightweight analogue devices to improve the operational performance of Mobile USAF Radar Approach Control (RAPCON) facilities. Special emphasis was placed upon the need for scheduling spacing, and guiding high performance aircraft returning from high priority missions. Operational requirements are outlined and designs are presented for an Approach Scheduling Control (ASCON) Computer, an Approach Spacing Computer, and a Tangential Approach Computer. The study was supplemented by the construction of a breadboard model of the Approach Spacing Computer, for testing and evaluation. (Author)

AD-276 724 Div. 30, 9
(TISTA/SEB) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOURCE FLOW EFFECTS IN CONICAL HYPERVELOCITY

NOZZLES,
by Jack D. Whitfield and Glenn D. Norfleet.
June 62, 15p. incl. illus. 5 refs. (Rept. no. AEDC TDR 62-116)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: *Conical nozzles - Hypersonic flow, *Hypersonic wind tunnels - Wind tunnel nozzles. Hypersonic nozzles, Conical bodies, Gas flow, Theory, Errors, Tests.

Source flow effects in conical hypervelocity nozzles are studied by means of a simple Newtonian theory for slender conical bodies. Experiments were conducted to examine the validity of this simple theoretical approach and a semi-empirical theory is developed to assess the magnitude of source flow effects. Significant source flow effects were found, and the need for contoured hypervelocity wind tunnel nozzles is shown. (Author)

AD-276 814 Div. 30, 12
(TISTW/DLW) OTS price $23.50

Aeronutronic, Newport Beach, Calif.
SPACE DETECTION AND TRACKING SYSTEM (SPADATS) SEMI-AUTOMATIC CENTER. PROGRAMMING DOCUMENT (REVISED).
1 May 62, 1v. incl. illus. tables (Publication no. U-1691, Supersedes Publication no. C-1339, AD-327 005)
(Contract AF 19(604)7375)
Unclassified report

DESCRIPTORS: *Satellite vehicles - Tracking, *Programming - Mathematical computer data, *Combat information centers - Data processing systems, *Digital computers - Programming. Automatic, Data storage systems, Computer logic, Orbital flight paths.

A description is presented of the programming system that meets the present requirements of the Phase A' Space Detection and Tracking System (SPADATS) Semi-Automatic Center. The program descriptions contain the program specifications. They describe the program function, tell what input data are processed and the kind and form of the output results. Special features important to the understanding of the program operation and to the interpretation of the results are also described. (Author)

AD-276 895 Div. 30
(TISTP/JW) OTS price $2.60

Electronic Defense Lab., Mountain View, Calif.
ANALOG SIMULATION OF FREQUENCY RESPONSE TECHNIQUES FOR NONLINEAR SERVOMECHANISMS,
by J. A. Peterson. 23 Apr 62, 23p. incl. illus. 9 refs. (Technical memo. no. EDL-M454)
(Contract DA 36-039-sc-87499)
Unclassified report

DESCRIPTORS: *Analog computer, *Nonlinear systems. Computer logic, Programming, Servomechanisms, Frequency analyzers, Feedback, Simulation.

A computer simulator is described that will plot directly the describing function for nonlinear elements and can also be used for plotting polar plots of linear transfer function. The simulator can be used to give the frequency response polar diagram for the combined linear and nonlinear elements. Compensation can be inserted in the loop and its effect on the polar diagram evaluated directly. Abstract nonlinearities may be handled with ease on the computer. (Author)

AD-276 907 Div. 30, 25
(TISTM/EJH) OTS price $7.60

Aeronutronic, Newport Beach, Calif.
INVESTIGATION AND FUNDAMENTAL STUDY OF CRYOSAR OPERATION AND APPLICATION.
Final quarterly scientific rept. no. 3, 1 Jan-31 Mar 62,
by L. Lambert, Jr. 1 May 62, 69p. incl. illus. table, 20 refs. (Publication no. U-1652)
(Contract AF 19(604)8458, Proj. 4608)
(AFCRL 62-334) Unclassified report

DESCRIPTORS: *Digital systems - Electronic circuits, *Data storage systems - Memory devices, *Germanium. Production, Single crystals, Growth, Ionization, Inelastic scattering, Electrons, Electron bombardment, Hydrogen, Dissociation, Low temperature research.

Experimental data on the impact ionization of germanium at liquid helium temperature with various compensations are reported. In particular, curves of the breakdown and sustaining field for various compensations were obtained. The relationshipsof peak current to both majority impurity concentration and compensation ratio are included. A phenomenological interpretation of the results is given. In the area of application, the cryosar was operated as a memory cell. The mode of operation employed offers several advantages over previous work. The results and extrapolations of this investigation are included. (Author)

AD-276 912 Div. 30
(TISTA/GEC) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
AERODYNAMIC DESIGN OF A CONTINUOUS HYPERVELOCITY WIND TUNNEL,
by K. R. Enkenhus, E. L. Harris and others.
Apr 62, 38p. incl. illus. 16 refs. (Aeroballistics Research rept. no. 172; NOLTR 62-20)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels - Design, *Hypersonics - Aerodynamics. Hypersonic nozzles, Wind tunnel nozzles, Hypersonic diffusers, Turbulent boundary layer, Thermodynamics, Transport properties, Heat transfer, Cooling, Hypervelocity vehicles, Guided missile noses, Oxygen, Recombination reactions.

An aerodynamic design study was made of a continuous, hypervelocity wind tunnel for simulating the flight environment of long-range ballistic missiles and glide vehicles at Mach numbers up to 20. Nozzles were designed by the method of characteristics for high-temperature air in dissociative and vibrational equilibrium. Since non-equilibrium flow was expected to occur under many conditions, the effect of a finite O recombination rate on the flow in hypersonic nozzles was determined for a wide range of supply conditions. The nozzle turbulent boundary-layer growth and heat transfer were calculated by a momentum-integral method employing thermodynamic and transport properties appropriate to high-temperature air. The extremely high heat-transfer rates near the nozzle throat create a severe cooling problem. Both convective cooling, using water or liquid metals, and film cooling, with air or water injection, were studied. The application of the electric arc as an air heating device, and the performance of a hypersonic diffuser were also examined. Conclusions are drawn from the results of this study regarding the range of free-flight conditions which can be simulated in the wind tunnel. (Author)

AD-276 965 Div. 30
(TISTE/CAM) OTS price $.50

Watertown Arsenal Labs., Mass.
POINT-CONTACT TRANSDUCERS FOR ULTRASONIC TESTING.
Rept. on Research of Materials for High Temperature Use,
by Otto R. Gericke. June 62, 9p. incl. illus. table (Technical rept. no. WAL TR 143.5/1)
Unclassified report

DESCRIPTORS: *Piezoelectric transducers, *Transducers, *Ultrasonics, *Ultrasonic radiation, *Non-destructive testing. Semiconductors, Electrostatic capacitance, Resistance, Vibration, Surfaces, Electrodes, Piezoelectric materials, Tests, Test equipment.

The feasibility of employing point-shaped ultrasonic transducers which directly amplify the detected ultrasonic signal was investigated. Two approaches were considered: one used a semiconductor point with a depletion layer at the very tip produced by a bias voltage, the other employed the variation of contact resistance with contact pressure. The latter method was explored experimentally and found suitable for the detection of ultrasonic energy. In addition, experiments are described in which high-frequency sparks were produced at the specimen surface to generate ultrasonic vibrations. (Author)

AD-276 999 Div. 30, 8
(TISTP/JW) OTS price $5.60

Electronics Research Lab., U. of Calif., Berkeley.
STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS (II),
by S. C. Gupta. 13 Nov 61, 55p. incl. illus. tables, 13 refs. (Series no. 60, Issue no. 414)
(Grant no. AFOSR-62-70)
(AFOSR-2442) Unclassified report

DESCRIPTORS: *Pulse modulation, *Control systems. Data processing systems, Computers, Signal-to-noise ratio, Nonlinear systems, Programming.

Computer solutions using IBM 704 Fortran Monitor coding of closed loop PWM systems are considered. Examples with simple linear plants with two types of input correlation functions are considered. The case of the pure integrator is also discussed. Modifications for delay element are given. Signal plus noise was considered for the open loop case and a simple example is given. Optimization using a first order discrete compensation is achieved both for open loop case and the closed loop case. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-276 994 Div. 31
(TISTE/CAM) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
FULL-SCALE STRUCTURAL INVESTIGATION OF THE HULL OF USNS MISSION CAPISTRANO (AG 162) AS MODIFIED FOR ARTEMIS,
by Louis A. Becker. May 62, 29p. incl. illus. tables, 4 refs. (Rept. no. 1593)
Unclassified report

DESCRIPTORS: *Ship hulls, *Girders, *Ship plates. Torque, Stresses, Moments, Strain gages, Thermocouples, Measurement, Test methods, Tests, Load distribution, Reinforcing steel.

The conversion of USNS MISSION CAPISTRANO (AG 162), formerly (AO 112), to an ARTEMIS support ship included cutting a hole vertically through the ship and reinforcing the remaining structure in the vicinity of the hole. Static loads which caused either longitudinal bending or torsional moments were applied to the hull. These loads produced strains at the corners of the hole that were twice as high as the main deck strains at Frame 57 outboard of the opening. However, the maximum strain at the corner of the hole was no more than 25 percent greater than the strains observed at a section similar to this section prior to modification. (Author)

AD-276 997 Div. 31
(TISTE/CAM) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
OPEN-WATER TESTS OF COUNTERROTATING PROPELLERS 3808 AND 3809 FOR AN ESCORT RESEARCH SHIP,
by G. L. Ober. May 62, 20p. incl. illus.
(Rept. no. 1638)
Unclassified report

DESCRIPTORS: *Marine propellers, *Dual rotation propellers. Aluminum, Drag, Thrust, Torque, Rotation, Dynamometers, Tests, Model tests, Hydrodynamics.

The results are presented of open-water evaluation tests of a set of model counterrotating propellers for an escort research ship. These tests were conducted for forward ship motion with locked and unlocked shafts and normal and reverse rotation. Thrust and torque coefficients, over a range of speed coefficients, are given for each condition. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-276 532 Div. 32
(TISTB/AW) OTS price $7.60

RAND Corp., Santa Monica, Calif.
COMMUNIST CHINA'S PETROLEUM SITUATION,
by K. C. Yeh. May 62, 69p. incl. illus. tables, 128 refs. (Memo. no. RM-3160-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Petroleum industry, *China. Industrial production, Supplies, USSR, Petroleum, Production, Economics.

Available data are given on the production, imports, and consumption of petroleum in Communist China in 1949-60. Prospects of expanding indigenous production and reducing dependence on imports from the Soviet Union are discussed. Some findings are Communist China's output of crude oil increased by more than ten times in the past decade; the petroleum industry has made extremely rapid progress, but the absolute level of production still falls short of meeting domestic demand. In 1960, about one-half of the

total supply of major petroleum products came from the Soviet Union, but this proportion is steadily declining. Total supply in absolute terms -- some 5 million tons in 1960 -- is still very small for an economy of China's size; in per-capita terms it is miniscule by the standard of developed economies. Clearly, this is one area in which Soviet trade policy could have serious consequences for China's future petroleum development. A cut in Soviet exports of petroleum and equipment would leave China in a position where current and near-future domestic supplies of petroleum would be insufficient to meet expected, or even normal, demand. Consequences of such action are discussed. (Author)

AD-276 800 Div. 32
(TISTP/FR) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
METHOD OF DETERMINING THE GAS EXCHANGE BETWEEN THE SOIL AND THE ATMOSPHERE AND THE CARBON DIOXIDE CONTENT IN SOIL AIR (I Metodike Opredeleniya Gazoobmena Mezhdu Pochvoy i Atmosferoy i Soderzhaniya Uglekisloty v Pochvennom Vozdukhe),
by B. N. Makarov. 22 July 53, 4p. incl. illus. table, 8 refs. (Trans. no. T-207 from Nauchnye Soobshcheniya i Meteodicheskiye Raboty 2:85-87, 1955)
Unclassified report

DESCRIPTORS: *Soils, *Carbon dioxide. Gas diffusion, Potatoes, Cereals, Grasses.

AD-276 890 Div. 32, 30
(TISTP/FR) OTS price $11.00

Boeing Co., Wichita, Kans.
ENGINEERING SERVICES TO STORE MATERIALS INFORMATION DATA ON MAGNETIC MEMORY TAPES.
Rept. for 15 Mar-14 Dec 61,
by Loren F. Johnson and Howard W. Smith. Jan 62, 142p. incl. illus. tables, 8 refs.
(Contract AF 33(616)8036, Proj. 1(8-7381))
(ASD TDR 62-60) Unclassified report

DESCRIPTORS: *Data processing systems, *Information retrieval. Classification, Digital computers, Programming, Alloys, Plastics, Elastomers, Ceramic materials, Chemical properties, Surface properties, Mechanical properties, Electromagnetic properties.

Research conducted on a mechanized data storage and retrieval system is summarized. Scientific information chosen for storage, presently in the form of tables and graphs in MIL-HDBK-5, has been assembled into a large array of numbers. Materials and properties major groups form the ordinate and abscissa of a two-dimensional classification system. One system classifies knowledge of materials; the other classifies properties. The digital computer flow charts required for programming are given. All research connected with this project is included, with the exception of the magnetic tape reel containing the actual data. (Author)

AD-276 933 Div. 32
(TISTB/AW) OTS price $12.50

RAND Corp., Santa Monica, Calif.
SOVIET NATIONAL INCOME AND PRODUCT, 1956-1958,
by Nancy Nimitz. June 62, 179p. incl. tables, 41 refs. (Memo. no. RM-3112-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTRS: *USSR, *Economics. Industrial production, Economic conditions, Costs, Money.

Estimates are given of the national income and product of the USSR at current actual prices for the years 1956-1958, and at current adjusted prices (ruble factor cost) for the years 1949-1958. Over the period 1956-1958 the share of gross investment rose from 26 to 28 per cent (or from 30 to 32 per cent at adjusted prices), while the share going to consumption remained constant at about 56 per cent (50 per cent at adjusted prices). Per capita consumption, roughly deflated to constant prices, increased at an average rate of 6 per cent a year, compared with 9 per cent for the period 1953-1955. The share of outlays explicitly designated to defense declined from 7.3 to 5.9 per cent of total GNP (or from 8.5 to 6.8 per cent at adjusted prices). Since prices of military goods may have fallen significantly (unlike the prices of civilian goods and services, which were comparatively stable), real defense outlays probably increased more than money outlays. (Author)

AD-276 945 Div. 32
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
EVALUATION OF REPORT SUMMARIES: QUANTITATIVE RESULTS AND DISCUSSION,
by John D. Ford, Jr. 23 May 62, 15p. incl. illus. tables, refs. (Technical memo. no. TM-662/001/00)
Unclassified report

DESCRIPTORS: *Information theory. Documentation, Abstracting, Selection, Time, Analysis of variance.

Two types of human-produced report summaries were compared. One type, designated term-diagram format, consisted of a spatial arrangement of subjects and objects with appropriate modifiers interconnected by verb phrases. The other type, designated natural language format, consisted of statements having the usual sentence structure. The results include the following: (1) subjects required longer times (about eight percent) when using the term-diagram format in the preparation of summaries; (2) although the term-diagram format is a more efficient vehicle for conveying information, subjects in a real-time situation did not convey more information using this type; (3) when using term-diagram summaries, to answer information requests, Decision Makers supplied a significantly greater proportion of correct replies; and (4) when interviewed after the experiment, nearly all subjects expressed preference for the term-diagram format. The results are interpreted to mean that a format involving structural changes in sentence organization is a procedure which humans can use effectively in producing report summaries. As an output to information users, such a format is superior to natural language format. (Author)

AD-276 946 Div. 32, 30
(TISTP/FR) OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE COMPUTER AS A TOOL FOR THEORY DEVELOPMENT,
by John T. Gullahorn and Jeanne E. Gullahorn. 5 June 62, 22p. incl. illus. refs. (Rept. no. SP-817)
Unclassified report

DESCRIPTORS: *Social communication, *Employee relations. Conferences, Sociology, Theory, Digital computers.

Research involving computer simulation not only plays the passive role of verifying and testing

theory; it performs active functions for the development of theory. Formulating a theory as a computer model affords one a relatively tractable representation and possibly a more meaningful conceptualization, having increased precision as a result of the clarification of concepts necessitated by the programming process. Furthermore, a unique opportunity is provided by the modern digital computer's capacity to generate the programmed model's dynamic implications. In a computer run investigating a theory's processes it is not unlikely that unanticipated, anomalous, and strategic data may result and become the occasion for developing a new theory or for extending the existing model. (Author)

33. TRANSPORTATION

AD-276 515 Div. 33
(TISTE/CDM) OTS price $9.10

Ohio River Div. Labs., Engineer Corps., Cincinnati.
SMALL SCALE MODEL STUDIES OF PRESTRESSED RIGID PAVEMENTS. PART 1. DEVELOPMENT OF THE MODEL AND RESULTS OF EXPLORATORY TESTS,
by P. F. Carlton and Ruth M. Behrmann. May 62, 102p. incl. illus. tables (Technical rept. no. 4-13)
Unclassified report

DESCRIPTORS: *Pavements - Concrete, *Runways, *Landing fields. Stresses, Deflection, Model tests, Test methods, Design, Measurement, Military aircraft, Beams, Elasticity, Reinforced concrete, Cements, Tests.

This is the first of a series of four reports presenting findings from a small-scale model study of the structural behavior of prestressed concrete pavements. Purpose of the over-all study was development of load-moment relationships for both elastic and elasto-plastic conditions of loading, and the application of these relationships to formulation of a rational approach to the design and evaluation of prestressed airfield pavements. In part I, physical properties of the model are given as are techniques used in designing, constructing and instrumenting both pre-tensioned and post-tensioned prestressed slabs. Results of exploratory tests on pre-tensioned model slabs are discussed and analyzed. (Author)

AD-276 516 Div. 33, 13
(TISTE/CDM) OTS price $5.60

Ohio River Div. Labs., Engineer Corps., Cincinnati.
A METHOD FOR ESTIMATING THE LIFE OF RIGID AIRFIELD PAVEMENT,
by R. L. Hutchinson. Mar 62, 45p. incl. illus. tables (Technical rept. no. 4-23)
Unclassified report

DESCRIPTORS: *Landing fields, *Pavements, *Runways - Life expectancy. Tests, Test methods, Landing impact, Airplane landings, Concrete, Reinforced concrete, Airports, Jet fighters, Jet bombers, Design.

A method for estimating the life of rigid airfield pavements is presented which is applicable for any type aircraft traffic on all types of rigid pavement including overlays. The basic concept of the method presented is that any rigid pavement will withstand a certain number of stress repetitions before it cracks. The number of stress repetitions is dependent upon the magnitude of stress which is in turn dependent upon such things as: magnitude of load, gear configuration, traffic distribution, pavement strength, and foundation. All are considered in the method presented; an example of the use of the method is shown as well as three classical examples considering special problems. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

AGRICULTURE

Plant Cultivation

ORO-485 $0.50

Isotope Development Lab., Research Triangle Inst., Durham, N. C.
MOISTURE DETERMINATION IN CORN BY NEUTRON MODERATION, by Lewis F. Ballard and Ralph L. Ely, Jr. Final rept. on Contract AT(40-1)-2513. 31 July 61, 15p. 5 refs. RTI-2513.

TID-14476 $1.10

Michigan State U., East Lansing.
MECHANISMS OF UPTAKE OF IONS BY ABOVE GROUND PLANT PARTS AND THEIR SUBSEQUENT TRANSPORT AND REDISTRIBUTION WITHIN THE PLANT. Technical progress rept. on Contract AT(11-1)-888. 1961, 7p. 10 refs.

TID-14095 $1.60

Taiwan Provincial Chung-hsing U., Taichung.
THE USE OF RADIATION TREATMENT METHODS TO STUDY RICE GENETICS AND IMPROVE RICE VARIETIES USED IN SOUTHEAST ASIA. Progress rept. Aug 61, 12p.

ASTRONOMY

Order from GPO $0.25
D 213.8/3:965

Nautical Almanac Office, Washington, D. C.
ASTRONOMICAL PHENOMENA FOR THE YEAR 1965. 1961, 33p.

Preprint of selected pages from American Ephemeris and Nautical Almanac

DESCRIPTORS: Astronomy, *Astronomical data.

Astrophysics

BNL-710(T-247) $0.50

Brookhaven National Lab., Upton, N. Y.
GALAXIES, by Otto Struve, Brookhaven Lecture Series no. 13, 17 Jan 62. May 62, 16p. 14 refs.

Order from GPO $0.35 as
NAS 1.2:Sp1/4/962

National Aeronautics and Space Administration, Washington, D. C.
SPACE: THE NEW FRONTIER. Revised ed. 1962, 48p.

DESCRIPTORS: *Space flight, *Spaceships, Manned, *Moon, Exploration, *Solar systems, Space probes, Sounding rockets, Satellite vehicles.

Contents:
Space and you
The history of space flight
The solar system
Space probes and satellites-general principles
Unmanned satellites and sounding rockets
Unmanned lunar and interplanetary spacecraft
Manned space exploration
  Projects Mercury and Gemini
  Project Apollo
  X-15 and Dyna Soar
The space launch vehicles
The biology of space
Space exploration-the techniques
  Rocket propellants
  Guidance in space
  Communications
  Tracking
Glossary of space terms

NASA N62-12497 $1.10

Yale U., New Haven, Conn.
EXPERIMENTS ON RELATIVITY, COSMOLOGY (PART I). ATOMIC AND MOLECULAR COLLISION CROSS-SECTIONS (PART II) by Vernon W. Hughes and Hugh G. Robinson. Progress rept. on Grant. no. NsG 1-59. 11 Apr 62, 6p.

BEHAVIORAL SCIENCES

PB 160 644 $3.60

Northwestern U. [Evanston, Ill.]
AN ACTUARIAL APPROACH TO CLINICAL JUDGMENT, by William A. Hunt. Rept. on Contract [N]onr-450(11). [1958] 34p. 31 refs. AD-159 622.

DESCRIPTORS: *Reasoning, Reliability, *Medical personnel, *Behavior, Psychology.

Human Engineering

PB 160 651 $7.60

[Coordinated Science] Lab., U. of Illinois, Urbana.
HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART III: FLASH RECOGNITION - SCALE READING, by James W. Osborne, Henry Quastler and others. Rept. on Contract DA 36-039-sc-56695. Oct 59, 75p. 16 refs. Rept. no. R-68; AD-83 017.

DESCRIPTORS: *Information theory, Data, Transmission, *Human engineering, Engineering, Reading, *Visual perception, Psychology, Display systems, Conditioned reflex, Reflexes, Tests.

Contents:
Evaluation of information transmitted
Locating a dot in a square: methods, results, and comment
Dial reading: method, results with single dials, multiple dials and pointers
Scale reading: method, single scales, two and three scales
Multiple scales with variable number of graduations: results
Discussion

PB 160 652 $8.60

[Coordinated Science] Lab., U. of Illinois, Urbana.
HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART IV: FLASH RECOGNITION OF FAMILIAR DISPLAYS, by L. Augenstine, A. A. Blank and others. Rept. on Contract DA 36-039-sc-56695. Jan 56, 92p. 21 refs. Rept. no. R-69; AD-89 543.

DESCRIPTORS: *Information theory, Data, Transmission, *Human engineering, Engineering, *Visual perception, Psychology, Display systems, Conditioned reflex, Reflexes, Tests.

Contents:
Evaluation of information transmitted
Equipment
Letter recognition: A. Random displays, B. Redundant displays
Flash poker
General discussion

PB 160 653 $2.60

[Coordinated Science] Lab., U. of Illinois, Urbana.
HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART V: THE FORCE OF HABIT, by Henry Quastler and Betty Brabb. Rept. on Contract DA 36-039-sc-56695. Jan 56, 28p. 5 refs. Rept. no. R-70; AD-89 460.

DESCRIPTORS: *Information theory, Data, Transmission, *Human engineering, Engineering, Painting, Typewriters, *Reaction time, Reaction (Psychology).

Contents:
Methods
Simple reaction times
Disjunctive reaction times: single letters
Disjunctive reaction times: two, four, and many letters

PB 160 646 $2.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
AN AUTOMATIC SIMULATOR FOR INVESTIGATION OF PHOTOINTERPRETIVE PROCESSES, by Glenn A. Fry and Jay M. Enoch. Interim technical rept. no. 1, 1 May-31 July 56, on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. Sep 56, 30p. OSURF Proj. 696.

DESCRIPTORS: *Visual perception, *Ophthalmology, *Reaction time, *Targets, *Aerial photographs, *Aerial reconnaissance, *Target recognition, Detection, Simulation, *Military personnel, *Photographic analysis.

One Automatic Presentation and Recording Simulator unit has been designed and constructed. Initial trials are being conducted in the primary phases of the experimental program. Evaluation of factors in design will be considered in making alterations of the working plans prior to constructing two or more additional instruments to handle the anticipated volume of data to be used in practical and theoretical approaches to a solution of the problem. (Author)

PB 160 640 $6.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION, by Glenn A. Fry and Jay M. Enoch. Interim technical rept. no. 2, 1 Aug-31 Oct 56, on Contract AF 30(602)1580. 1 Feb 57, 67p. 5 refs. OSURF Proj. no. 696; RADC-TN-57-152; AD-232 141.

DESCRIPTORS: *Visual perception, *Opthalmology, *Reaction time, *Targets, *Aerial photographs, *Aerial reconnaissance, *Target recognition, Detection, Simulation, *Military personnel, *Photographic analysis.

Automatic target presentation and scoring devices were constructed for the study of the human aspects of photo-interpretation. The task of the subject is defined by the experimenter as is the nature of the target, i.e. detection or recognition. The data were graphically

analyzed to determine the interactions of the various factors involved in the task. The effect of presentation rate on frequency of seeing at various levels of contrast was studied, and an optimum rate of 1 target every 3 sec was indicated. Reaction time was found to vary with duration of presentation. Frequency of seeing curves were derived for luminance and contrast. Research with the ophthalmograph unit yielded data on the search path and duration of fixation. Over 10% redundancy in fixation was found; the duration of fixations tends to become less the longer the observer looks at the photograph. There may be some relationship between fixation duration and extent of eye movement. (See also PB 160 646)

BIOLOGICAL SCIENCES

TID-13023 $2.60

Children's Cancer Research Foundation, Boston, Mass.
TRANSFUSIONS OF FRESH PLATELET CONCENTRATES TO PATIENTS WITH SECONDARY THROMBOCYTOPENIA, by Isaac Djerassi, Sidney Farber and others. Rept. on Contract AT(30-1)-1753. 20 July 61, 22p. 20 refs. Prepared in cooperation with The Children's Hospital Medical Center and Harvard Medical School.

PB 160 286 $1.10

Naval Medical Research Inst., Bethesda, Md.
FURTHER STUDIES OF THE INTERACTION OF HISTAMINE AND POTASSIUM CHLORIDE IN MICE AND GUINEA PIGS, by R. L. Zwemer, J. J. Martorano, and R. Truscoe. Vol. 13, p. 671-678. 28 Sep 55, 9p. 3 refs. Research rept. on Project NM 007 081.17.02.

DESCRIPTORS: *Histamines, *Potassium compounds, *Chlorides, Mice, Toxicity.

As the result of previous experimental work it was concluded that although individual concentrations of histamine and potassium might not be wholly responsible for the symptom complex of shock, an increase of both of these at the same time could prove to be fatal. In order to test this further, experiments were designed to determine the ratios of histamine and potassium that re-enforce each other and also determine whether the symptom complex of shock would be altered by the relative proportion of these two substances. Experiments on 1,632 mice and 476 guinea pigs have demonstrated that the symptoms of potassium poisoning are enhanced by the simultaneous injection of histamine and that the symptoms of shock produced by the injection of histamine are greatly re-enforced by the addition of small amounts of potassium chloride. The combination of these two substances gave lethal effects even when amounts of each, if used separately, were so small as to produce no observable symptoms. (Author)

TID-15963 $5.60

Wabash Coll., Crawfordsville, Ind.
RATES AND PATTERN OF MOVEMENT OF RUBIDIUM^{86} AND PHOSPHORUS^{32} IN A CENTRAL MESOPHYTIC FOREST, PARKE COUNTY, INDIANA, by Robert Petty. Annual progress rept. on Contract AT(11-1)-1006. 25 Feb 62, 54p. 22 refs.

Anatomy and Physiology

PB 160 052 $1.10

Illinois U. [Urbana].
CARDIOVASCULAR EFFECT OF REFEEDING STRESS FOLLOWING STARVATION. I. PRELIMINARY EXPERIMENTS, by B. Connor Johnson and Vincent Fiorica. Rept. on Contract AF 41(657)130. Mar 58, 6p. 3 refs. Technical note AAL TN-59-8.

DESCRIPTORS: *Starvation, *Stress (Physiology), *Circulatory system, *Blood pressure, Respiration, Heart, Physlology, Pigs, Food, Feeding.

Observations on cardiovascular failure in humans being refed after subsisting on very low caloric intakes have indicated the need for a study of the factors involved in this stress and methods whereby stress could be relieved. In the studies which follow, the pig is used as an experimental animal because of its susceptibility to heart failure and to over-eating. This report includes the results of preliminary experiments carried out to determine the feasibility of determining blood pressures in the pig and the effects on blood pressure of two different dietary regimens and of starvation.

PB 160 053 $1.60

Illinois U. [Urbana].
CARDIOVASCULAR EFFECTS OF REFEEDING STRESS FOLLOWING STARVATION. II. EFFECT OF MAINTENANCE AND STARVATION ON CARDIAC RESPONSES IN THE PIG, by B. Connor Johnson and Vincent Fiorica. Rept. on Contract AF 41(657)130. July 58, 19p. 4 refs. Technical note AAL-TN-59-9.

DESCRIPTORS: *Starvation, *Stress (Physiology), *Heart, *Blood pressure, Respiration, Electrocardiography, Diet, Carbohydrates, Pigs, Physiology, Circulatory system, Feeding.

This report presents blood pressure and electrocardiographic data obtained during normal feeding and starvation, as well as some data for the carbohydrate refeeding period. (See also PB 160 052)

PB 160 054 $1.60

Illinois U. [Urbana].
CARDIOVASCULAR EFFECTS OF REFEEDING STRESS FOLLOWING STARVATION. III. REALIMENTATION WITH PURE CARBOHYDRATE AND PROTEIN, by B. Connor Johnson and Vincent Fiorica. Rept. on Contract AF 41(657)130. Jan 59, 18p. 4 refs. Technical note AAL-TN-59-10.

DESCRIPTORS: *Starvation, *Stress (Physiology), Heart, Blood pressure, Circulatory system, Electrocardiography, Respiration, *Carbohydrates, *Proteins, Physiology, *Diet, Pigs, Feeding.

This note presents the results of carbohydrate and protein refeeding experiments sequential to starvation. (See also PB 160 053)

PB 160 290 $1.60

Naval Medical Research Inst., Bethesda, Md. GLUTATHIONE INCREASE IN POTASSIUM TOLERANCE IN MICE, by R. L. Zwemer, E. P. Vollmer, and M. M. Carey. 15 Jan 51, 11p. 7 refs. Rept. on Project NM 007 081.11.02.

DESCRIPTORS: *Glutathione, *Potassium tolerance, Mice, Potassium, Toxicity.

Glutathione has been found to be singularly effective in protecting against otherwise fatal potassium intoxication. The protection was effective immediately and lasted for about six hours, when 50 mg. of glutathione was given to a 20 gram mouse. Within the limits of 5 mg. to 80 mg. per mouse, the per cent of survivors was in relation to the amounts of glutathione given, when the amount of potassium was constant and the time between protective and shock injections was one and one-half hours. Approximately 900 white Swiss mice were used in four series of experiments. (Author)

PB 160 291 $1.10

Naval Medical Research Inst., Bethesda, Md. GLUTATHIONE PROTECTION AGAINST POTASSIUM IN ADRENALECTOMIZED MICE, by J. J. Martorano, R. L. Zwemer, and E. P. Vollmer. Vol. 11, p. 27-32. 13 Jan 53, 7p. 13 refs. Research rept. on Project NM 007 081.11.05.

DESCRIPTORS: *Glutathione, *Potassium tolerance, Mice, Potassium, Toxicity, Adrenal glands.

Experiments show that glutathione is effective in increasing potassium tolerance in mice, in the absence of their adrenal glands. Previous work had shown that glutathione would protect normal mice against potassium toxicity, and that similar amounts of glutathione lowered the ascorbic acid and the cholesterol content of the adrenals of guinea pigs and rats. Adrenalectomized male mice of about the same age and weight were subjected to a test of their potassium tolerance 6 to 25 days after operation. Each of 122 mice were given subcutaneously 50 mg. of glutathione (0.5 ml. of 10 per cent sol. in 0.85 per cent NaCl neutralized with NaOH to about pH 6.7). Control injections of 0.5 ml. of 0.85 per cent sodium chloride were given to 126 mice. After three hours the animals received an intraperitoneal injection of 0.01 ml. of six per cent KCl per gram body weight. Only 12 per cent of the saline injected controls survived, in contrast to 54 per cent of the glutathione treated adrenalectomized mice, therefore tissues other than adrenal would seem to be involved in the protective mechanism. (Author)

Biochemistry

UCLA-503 $1.60

California U., Los Angeles, School of Medicine. ONCOGENIC PROPERTIES OF DESOXYRIBOSE NUCLEIC ACID ISOLATED FROM PAROTID GLAND CARCINOMAS, by Esther Fincher Hays and Jeanne Alexander Carr. Rept. on Contract AT(04-1)-GEN-12. May 62, 14p. 16 refs.

UCRL-10045 $3.60

Lawrence Radiation Lab., U. of California, Berkeley. ENERGY CAPTURE AND CONVERSION BY PHOTOSYNTHESIS, by J. A. Bassham. Rept. on Contract W-7405-eng-48. Feb 62, 35p. 24 refs.

PB 160 251 $1.10

Naval Medical Research Inst., Bethesda, Md. THE ENERGETICS OF ACID-CATALYZED HYDROLYSIS OF TRIPHOSPHORIC AND PYROPHOSPHORIC ACIDS, by S. L. Friess. Vol. 10, p. 11-19. 23 Jan 52, 10p. 10 refs. Research rept. on Project NM 000 018.06.07.

DESCRIPTORS: *Phosphoric acids, *Hydrolysis, Acids, Catalysis, Chemical reactions, *Muscles.

In the acid-catalyzed hydrolysis of triphosphoric and pyrophosphoric acids, a direct dependence of first order rate constants on the concentration of excess hydrochloric acid present is noted for each reaction. Both reactions show a negative salt effect with respect to added sodium chloride. Under nearly equivalent conditions, the first stage of acid-catalyzed hydrolysis of triphosphoric acid is approximately six times faster than that for pyrophosphoric acid. This effect is shown to be caused by a difference of 4 e.u. in entropies of activation for the two hydrolyses. The reactions are further characterized by equal values (ca. 22.8 kcal./mole) of their energies of activation. The connection of these data with the general problem of hydrolysis of "high energy phosphate bonds" is mentioned. (Author)

PB 160 252 $1.60

Naval Medical Research Inst., Bethesda, Md. THE ENTHALPY CHANGE ON ADENOSINE TRIPHOSPHATE HYDROLYSIS, by Richard J. Podolsky and Manuel F. Morales. Vol. 13, p. 409-422. 12 Aug 55, 15p. 32 refs. Research rept. on Project NM 000 018.11.07.

DESCRIPTORS: *Adenosine phosphates, Hydrolysis, Enthalpy, Myosin, Catalysts, Thermodynamics.

There are reported measurements of the heat produced when a mole of adenosine triphosphate is enzymatically hydrolyzed to adenosine diphosphate and orthophosphate, under conditions (pH 8.00) such that there is simultaneously generated and neutralized (by various buffers) one mole of H^+. The heat produced by this neutralization is measured in separate experiments also reported here. By subtracting the neutralization heat from the heat observed on hydrolysis, it is shown that the heat of hydrolysis per se is not - 12 Kcal/mole ATP, as currently thought, but -4.7 Kcal/mole. This result casts some doubt over whether it is really proper to consider the hydrolysis of ATP as a marked energy-producing biochemical reaction. (Author)

PB 160 264 $1.10

Naval Medical Research Inst., Bethesda, Md. EXTENT OF DEESTERIFICATION OF GLYCEROL PECTATE IN VITRO AND IN VIVO, by J. F. Saunders (Office of Naval Research) and C. D. West. Vol. 14, p. 979-986. 21 Dec 56, 8p. 5 refs. Research rept. on Project NM 000 018.14.01; AD-129 944.

DESCRIPTORS: *Pectins, Chemical reactions, Physiology, *Plasma substitutes.

From this limited study evidence has been presented which appears to indicate that no significant deesterification of glycerol pectate takes place in blood and urine, both in vitro and in vivo. At the end of 4 3/4 hr only 30.3% of the initial dose of glycerol pectate remained in the circulation. The elimination of glycerol pectate from the circulation was almost complete by 48 hr and urinary excretion was completed between 72 and 100 hr, insofar as it was possible to determine by the chemical methods used in this experiment. From the data obtained it appears possible that tissue storage takes place since at the end of 72 hr only 72.7% of the initial dose of glycerol pectate had been excreted in the urine and none remained in the blood stream after 48 hr. Difficulty in reconstituting glycerol pectate stored in the lyophilized form presents a serious complication in its practical application as a plasma expander. (Author)

PB 160 255 $2.60

Naval Medical Research Inst., Bethesda, Md.
THE ENZYMATIC INTERACTION BETWEEN MYOSIN AND NUCLEOTIDES, by Jacob Joseph Blum. Vol. 13, p. 57-80. 5 Feb 55, 25p. 53 refs. Research rept. on Project NM 000 018.11.01.

DESCRIPTORS: *Myosin, *Nucleotides, *Enzymes, Biochemistry, Biophysics.

Equations are derived showing the interrelations between light scattering changes and enzyme kinetic quantities, such as the Michaelis-Menten constant ($\bar{K}_1$). This theory is applied to the interaction between the deformable enzyme myosin and the nucleotides adenosine, uridine and inosine - triphosphates. From the $\bar{K}_1$ values obtained, and from chemical measurements of the velocity (v) of splitting of each of these compounds (in the presence and absence of Ca^{++} and Mg^{++}) it was possible to explain the observed sequences of $\bar{K}_1$ and of v. A two-point interaction of the substrate with the enzyme occurs; the phosphate end of the substrate attaches itself to one part of the enzymatic site, while the six position of the ring is bound to the other end of the site by a magnesium ion which is an intrinsic part of the site. The strength of interaction of the ring to the internal Mg^{++} is evaluated by resonance considerations. It is shown that desorption of bound diphosphate is a relatively slow process, having considerable influence on the observed rate. The desorption of bound product has been treated analytically.

Botany

PB 160 590 $3.60

California Forest and Range Experiment Station, Berkeley.
CROWN CHARACTERISTICS OF SEVERAL HARDWOOD TREE SPECIES. RELATIONS BETWEEN WEIGHT AND CROWN BRANCHWOOD AND FOLIAGE, AND STEM DIAMETER, by Theodore G. Storey and W. Y. Pong. May 57, 33p. p. 33-34 deleted. Interim technical rept. AFSWP-968.

DESCRIPTORS: Plants, *Forestry, *Trees, Physical properties, Drag.

This study was made to investigate the relation between the physical characteristics of crown and stem of several broadleaf tree species. The results are presented in a number of generalized relations correlating these characteristics.

PB 160 589 $5.60

California Forest and Range Experiment Station, Berkeley.
TREE BREAKAGE CHARACTERISTICS UNDER STATIC LOADING; PONDEROSA PINE, by W. L. Fons and W. Y. Pong. Nov 57, 51p. 7 refs. Technical rept. AFSWP-867, supersedes AFSWP-406; AD-206 654, supersedes AD-17 865.

DESCRIPTORS: *Trees, Fracture (Mechanics), Stresses, Load distribution, Deflection, Statics.

Twenty-nine ponderosa pine trees, selected from good and poor sites were tested under static loading. Quantitative measures of the force and deflection required to break and uproot these trees were recorded. Static work modulus values were calculated by use of dimensionless parameters of force, deflection, and spring constant derived from the field data of each tree. The results are presented by plotting, by site, the actual frequency distribution of static work modùli as a percentage of the cases occurring which are equal to or less than any chosen modulus value. Poor site trees required more energy to fail than the good site trees, despite the fact that most of the poor site trees were uprooted. Energy differences were attributed to differences in base firmness, and the effect it had on deflection; greater deflections were recorded for the poor site trees. Widespreading lateral roots of the good site trees and nearly rock-free soil conditions aided these trees in resisting uprooting.

PB 160 591 $4.60

California Forest and Range Experiment Station, Berkeley.
TREE BREAKAGE CHARACTERISTICS UNDER STATIC-LOADING OF SEVERAL HARDWOOD SPECIES, by W. Y. Pong. Oct 56, 46p. p. 43-44 deleted. Interim technical rept. AFSWP-970.

DESCRIPTORS: Plants, *Forestry, *Trees, *Wood, Stresses, Statistical analysis, Fracture (Mechanics), Load distribution.

An investigation was made to determine the energy necessary to cause breakage and uprooting of hardwood trees, and to determine the extent of damage that may occur in a hardwood forest at a given energy level. The analysis presented in this paper delineates essential parameters involved in breakage and uprooting of tree stems by a single load. These parameters provide a basis for the correlation of experimental data.

Microbiology

TID-14308 $1.10

Illinois U., Urbana.
METABOLIC PATHWAYS IN MICROORGANISMS. Final rept. 1 Mar 51-29 Feb 60, on Contract AT(11-1)-67. 10p.

PB 152 090 $1.10

[Iowa Agricultural Experiment Station, Ames].
FACTORS AFFECTING GERM TUBE DEVELOPMENT OF PUCCINIA UREDOSPORES, by Frederick G. Smith. Technical rept. no. 14, 1 Jan-31 Dec 59, on Contract Nonr-585(00). [1960] 3p. AD-232 634.

DESCRIPTORS: *Spores, Growth, Inhibition, Buffers.

More efficient methods of greenhouse spore production and optimum conditions of humidity and spore moisture content for cold storage were investigated. A search was made for improved media and buffering systems to provide better controlled conditions for quantitative analysis of cation exchange phenomena in spore germination and germ tube differentiation. Several methods were used to determine whether the self-inhibition of germination in dense spore suspensions was due to an endogenous inhibitor. Further analysis of data on cation interaction in spore germination has led to an improved formulation of the receptor site equilibrium.

Radiobiology

BNL-727(T-260) $2.00

Brookhaven National Lab., Upton, N. Y.
MEDICAL SURVEY OF RONGELAP PEOPLE SEVEN YEARS AFTER EXPOSURE TO FALLOUT, by Robert A. Conard, H. Eugene MacDonald and others. May 62, 92p.

TID-15046 $1.60

California U., Los Angeles. School of Medicine.
THE DETERMINATION OF ZINC, COPPER, AND IRON IN BIOLOGICAL TISSUES: AN X-RAY FLUORESCENCE METHOD, by George V. Alexander. Rept. on Contract AT(04-1)-GEN-12. 25 Jan 62, 17p.

TID-14828 $1.60

Iowa State U., Iowa City
RADIOIODINE STUDIES OF FETAL AND OTHER THYROIDS, by Titus C. Evans. Technical rept. on Contract AT(11-1)-291. Jan 62, 14p. 11 refs.

TID-14201 $2.60

Massachusetts General Hospital, Boston
SUMMARY OF PRINCIPAL ACCOMPLISHMENTS IN RADIOBIOLOGY, by William H. Sweet and Gordon L. Brownell. Progress rept. Jan 57-Oct 61, on Contracts AT(30-1)-1093 and AT(30-1)-1242. 24p. 42 refs. Nov 61.

PB 160 254 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE ENZYMATIC ACTIVITY OF RADIATED EXTERIORIZED SALIVARY GLANDS, by James A. English. Vol. 14, p. 227-236. 11 Mar 56, 10p. 2 refs. Research rept. on Project NM 006 012.04.100; AD-98-998.

DESCRIPTORS: *Salivary glands, Glands, *Radiation effects, *Enzymes, *X rays, Biochemistry, Glucose phosphates, Dehydrogenases, Rats.

It was previously determined that when salivary glands of rats were radiated in situ with 3,000 to 5,000 r of 200 KV X-ray there was a significant increase in specific activity of the glucose-6-phosphate and isocitric dehydrogenases. At the same time it was observed that there were other more general effects from this localized radiation. The present study was designed to determine what effect radiation (2,000 r) would have upon the enzyme systems of exteriorized salivary glands of rats under conditions wherein the rest of the animal was completely shielded. Under these conditions we observed no general effects upon the animals and even the weights of the radiated salivary glands were not significantly altered, whereas in the previous study this was not the case. The values for glucose-6-phosphate dehydrogenase were higher for radiated salivary glands in 17 out of 18 groups of animals, the average values in arbitrary units being 3.36 ± 0.71 for the nonradiated glands and 3.83 ± 0.67 for the radiated glands when all groups of rats were considered (probability 0.05). During the second week following radiation, the increase in activity of this enzyme was greater, the values being 3.04 ± 0.48 and 3.80 ± 0.42 respectively (probability 0.01). There was not a significant change in isocitric dehydrogenase following radiation of the exteriorized salivary glands. (Author)

PB 160 259 $1.60

Naval Medical Research Inst., Bethesda, Md.
EXPERIMENTAL PROCEDURES FOR THE SIMULTANEOUS EXPOSURE OF LARGE NUMBERS OF ANIMALS TO TOTAL BODY X-RADIATION, by W. H. Chapman, E. P. Cronkite and others. Rept. on Project NM 006 012.05.03. 3 July 50, 14p. 4 refs.

DESCRIPTORS: *X-rays, Exposure, Animals, *Radiation sickness, *Radiological dosage.

Methods and materiel are described for housing and irradiating animals in individual cages. Methods are described for simultaneously exposing large numbers of mice, rats, guinea pigs, rabbits or dogs to the same rate of X-radiation. This is accomplished by exposing animals in specially constructed irradiation cages which are positioned in the field of maximum uniform intensity of the radial beam of 1 and 2 Mev X-ray units. Methods are also described for studying the mortality of mice exposed simultaneously to different rates or to high rates of X-radiation. By simultaneously exposing large numbers of animals in individual cages it is possible to minimize many extraneous physical factors and obtain in a single experiment statistically reliable data on factors which may influence the mortality of radiation illness. (Author)

PB 160 263 $1.60

Naval Medical Research Inst., Bethesda, Md.
EXPERIMENTAL THERAPY OF THE GASTROINTESTINAL SYNDROME PRODUCED BY LETHAL DOSES OF IONIZING RADIATION, by R. A. Conard, E. P. Cronkite and others. Vol. 14, p. 275-286. 21 Mar 56, 13p. 30 refs. Research rept. on Project NM 006 012.04.93; AD-101 303.

DESCRIPTORS: Ionization, Radiation effects, *Radiation injuries, Therapy, Pathology, *Digestive system, *Radiobiology, Bone marrow.

Dogs exposed to sufficient ionizing radiation exhibit the gastrointestinal syndrome characterized by anorexia, vomiting and diarrhea with marked loss of fluids and electrolytes resulting in acute dehydration, vascular collapse and death in 3 to 4 days. Survival time can be prolonged in such dogs by adequate replacement of lost fluids, by parenteral infusions of electrolyte solutions and plasma. Administration of antibiotics and nutritional supplements probably also play a beneficial role in prolonging life. Death later is associated with the sequelae of bone marrow aplasia and possibly unknown lethal factors. The limited transfusion of white blood cell and platelet concentrates used in these experiments modified but did not completely correct the effects of bone marrow aplasia. (Author)

PB 160 287 $2.60

Naval Medical Research Inst., Bethesda, Md.
FURTHER STUDIES ON THE NATURE OF THE HEMORRHAGIC STATE IN RADIATION INJURY, by D. P. Jackson, E. P. Cronkite and others. 19 Nov 51, 22p. 16 refs. Research rept. on Project NM 006 012.04.40.

DESCRIPTORS: *Radiation injuries, *Hemorrhage, Dogs, Hematology, Pathology, Heparin.

Since heparinemia can be satisfactorily treated by such non-toxic anti-heparin substances as protamine sulfate and toluidine blue, it was considered desirable to explore further the nature of the hemorrhage produced by radiation injury with respect to the presence or absence of circulating anticoagulants.

PB 160 288 $1.10

Naval Medical Research Inst., Bethesda, Md.
FURTHER STUDIES WITH CELL-FREE EXTRACTS FROM MOUSE SPLEEN ON X-RAY INDUCED MORTALITY, by Friederich Ellinger. Vol. 14, p. 65-72. 25 Jan 56, 9p. 5 refs. Research rept. on Project NM 006 012.04.80; AD-98 996.

DESCRIPTORS: *X-rays, Pathology, *Radiation injuries, Countermeasures, *Spleen extract, Therapy.

In a continuation of previous studies, employing improved bioassay methods, the protective effect of cell-free saline extracts made from spleens of normal mice against X-ray-induced mortality in this species has been demonstrated using an X-ray dose which killed 78 percent of the animals in 15 days. Extracts made from the spleens of donor animals exposed to an X-ray dose which killed 55 percent of the donor animals failed to show a protective effect, which was in agreement with previous observations. A certain amount of parallelism between the protective effect of the various extracts made from normal mouse spleens and the failure to protect of those made from irradiated mouse spleens was found in studies of the total protein and NPN content of such extracts. It appears from the present study that within a wide range of concentration of total protein and NPN content such protection can be achieved. However, reduction of the average content of total protein and NPN below one-half of the lowest average value for normal spleens, as ascertained in samples made from the spleens of irradiated donor animals, was found to be associated with a lack of protection. Whether the failure of these extracts from irradiated spleens to protect is merely due to quantitative or also qualitative differences in these extracts cannot be decided at the present time. (Author)

PB 160 289 $1.60

Naval Medical Research Inst., Bethesda, Md.
GALLIUM: STUDIES OF ITS DEPOSITION IN AND CLEARANCE FROM BONE, by H. C. Dudley and H. H. Marrer. Vol. 10, p. 319-330. 25 June 52, 12p. 18 refs. Research rept. on Project NM 007 081.06.12.

DESCRIPTORS: *Gallium, Deposits, *Bone, *Radioactive isotopes, Toxicity, Metabolism.

Previously it has been shown that gallium, administered parenterally as the lactate or citrate, is rapidly deposited in osteoid structures, particularly in the teeth and in areas of osteoblastic activity. Radiogallium (Ga^{72}) has shown promise as a diagnostic agent for the localization of malignancies involving bone. Laboratory studies indicate that in the rabbit the route of administration, intravenous or subcutaneous, does not significantly influence the amount of Ga contained in the bones 24 hours after injection. By varying the dose from low to toxic levels, it has been shown in rats and rabbits that a low levels (1 - 15 mg. Ga/kg) the amount of Ga deposited in the femur is directly proportional to the dose. As the dosage approaches the toxic level (30 - 45 mg. Ga.) the amount of Ga deposited reaches a relatively constant value. Studies in dogs and rabbits of modes of clearance of Ga from bone by producing an acidosis, or by the administration of chelating agents, indicate that gallium is not significantly affected by these procedures. Normally it remains in the bone for six months or longer following administration of gallium citrate. (Author)

TID-15697 $8.10

Rochester U., N. Y.
HISTOPATHOLOGICAL EFFECTS OF X-IRRADIATION OF THE TRANSPLANTED ADRENAL CORTEX ON SHIELDED LYMPHATIC ORGANS IN RATS, by Alison T. Provoost. Master's thesis. 1953, 90p. 68 refs.

TID-15685 $9.60

Rochester U., N. Y.
A STUDY OF THE DEPOSITION AND RETENTION OF PLUTONIUM DIOXIDE IN RATS, by Bruce B. Boecker. Master's thesis. 1959, 117p. 53 refs.

UR-575 $0.75

Rochester U. School of Medicine and Dentistry, N. Y.
RADIATION INDUCED REGRESSION OF THE MURPHY-STURM LYMPHOSARCOMA, by Edmond S. Copeland. 15 June 62, 28p. 3 refs.

TID-14970 $2.60

Taylor U., Upland, Ind.
THE EFFECT OF X-RADIATION ON LONGEVITY IN DROSOPHILA MELANOGASTER. Technical progress rept. on Contract AT(11-1)-885. 23 Feb 62, 26p.

TID-14831 $1.10

Utah State U., Logan.
EFFECTS OF RADIUM ON STREAM ALGAE AND FISH BLOOD. Technical progress rept. on Contract AT(11-1)-1023. 2 Feb 62, 4p.

CHEMISTRY

Analytical Chemistry

TID-7629 $4.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
ANALYTICAL CHEMISTRY IN NUCLEAR REACTOR TECHNOLOGY. FIFTH CONFERENCE, GATLINBURG, TENNESSEE, OCTOBER 10-12, 1961. June 62, 363p. 123 refs.

K-1433 $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
MASS SPECTROMETER DETERMINATION OF MOLYBDENUM URANIUM RATIOS IN MIXTURES OF THE HEXAFLUORIDES, by J. C. Horton, J. R. Thomas, and V. L. Warren, Rept. on Contract W-7405-eng-26. 3 July 62, 9p. 7 refs.

TID-7616 $3.00

Sandia Corp., Albuquerque, N. Mex.
BIO-ASSAY AND ANALYTICAL CHEMISTRY. Annual meeting no. 6, October 13-14, 1960, Santa Fe, New Mexico. May 62, 235p. 69 refs.

Inorganic Chemistry

XDC-61-5-67 $1.10

General Electric Co., Cincinnati, Ohio.
PROPERTIES OF LITHIUM HYDRIDE III: SUMMARY OF GE-ANP DATA, by Frank H. Welch. Rept. on Contract AT(11-1)-171. 19 Apr 61, 8p.

PB 160 608 $1.60

Purdue U. [Lafayette, Ind.]
THE SILICIDES OF RHENIUM, by Alan W. Searcy and Robert A. McNees, Jr. Technical rept. June 51-June 52, on Preparation and Properties of Refractory Compounds of Silicon and Germanium, Contract N7onr-394/12. Feb 63, 18p. 10 refs. AD-5753.

DESCRIPTORS: *Rhenium compounds, *Silicides, Spectrographic analysis, Vapor pressure, Heat of sublimation, X-ray diffraction analysis.

Two new rhenium silicides, Re_3Si and ReSi, have been prepared and identified. The vapor pressures of these phases and of $ReSi_2$ have been measured by the Knudsen effusion method. From the vapor pressures, heats and free energies of formation have been calculated for these phases. (Author)

Organic Chemistry

TID-14778 $3.60

Brookhaven National Lab., Upton, N. Y.
FLUOROCARBON COMPOUNDS, by Marjorie Comstock. Bibliography. Rept. on Contract AT(30-2)-Gen-16. 20 Nov 61, 40p. 583 refs.

TID-15075 $1.60

Chicago U., Ill.
PREPARATION OF STABLE ORGANOBORON COMPOUNDS FOR USE IN NEUTRON IRRADIATION THERAPY, by Michael J. S. Dewar. Technical progress rept. on Contract AT(11-1)-889. 1961. 19p.

TID-14260 $1.10

Ethyl Corp., New York.
SYNTHESIS OF ORGANOMETALLIC COMPOUNDS OF THE LANTHANIDE AND ACTINIDE SERIES. Quarterly rept. no. 3, on Contract AT(11-1)-999. 15 Nov 61, 6p.

TID-14329 $2.60

Indiana U., Bloomington.
MEASUREMENT OF TRANSFERENCE NUMBERS IN AMINE SOLVENTS, by Laura C. Trout and Frederic C. Schmidt. Progress rept. on Contract AT(11-1)-256. 1961, 28p. 7 refs.

PB 160 606 $1.60

Naval Ordnance Test Station, China Lake, Calif.
INVESTIGATIONS OF THE NITROGLYCERIN-SODIUM HYDROXIDE REACTION, by William M. Ayres, Gerald C. Whitnack, and Raymond T. Merrow. 17 Jan 61, 14p. 7 refs. NAVWEPS rept. 7608; NOTS TP 2604; AD-251 378.

DESCRIPTORS: *Nitroglycerin, *Sodium compounds, Hydroxides, Chemical reactions, Spectrographic

analysis, Ultraviolet spectroscopy, Decomposition, *Hydrolysis.

The reaction between NaOH and nitroglycerin at various mole ratios was followed spectrophotometrically and the loss of nitroglycerin was determined polarographically after several hours reaction time. For the 6:1 and the 1:1 mole ratios, the disappearance of nitroglycerin and NaOH and the appearance of nitrite ion were followed throughout the reaction. The UV spectrum of the reaction solution undergoes an extensive change with reaction time. The initial decomposition of nitroglycerin occurs by an alpha-hydrogen elimination process. The formation of nitrate ion was not detected in reactions up to 6:1, but with a 30:1 ratio approximately 0.9 mole of nitrate was produced for each mole of nitroglycerin decomposed. This would indicate that a slow reaction with the formation of nitrate ion was occurring concurrently with the alpha-hydrogen elimination process. (Author)

ORNL-TM-254 $1.10

Oak Ridge National Lab., Tenn.
SYNTHESIS OF n-HEXYL AND n-HEPTYLBENZENE, by H. L. Holsopple. 14 June 62, 6p. 4 refs.

Physical Chemistry

IS-421 $1.75

Ames Lab., Iowa State U. [of Science and Tech.]
SOME PROPERTIES OF RARE EARTH NITRILOTRIACETATE COMPLEXES, by Samuel Charles Levy and Jack E. Powell. Feb 62, 75p. 62 refs.

PB 160 620 $1.60

Amherst Coll., Mass.
THE DIFFERENTIAL CAPACITY OF THE ELECTRICAL DOUBLE LAYER. IV. CAPACITY AND SURFACE CHARGE DENSITY OF THE MERCURY-SOLUTION INTERFACE IN TENTH-NORMAL AQUEOUS SOLUTIONS OF POTASSIUM SALTS AT 25°C, by D. C. Grahame, M. A. Poth, and J. I. Cummings. Technical rept. no. 7 on Thermodynamic Properties of the Electrical Double Layer, Contract N8onr-66903. 13 Dec 51, 19p. 16 refs. ATI-144 414.

DESCRIPTORS: *Electrical double layer, Thermodynamics, Electrochemistry, Polarization, Electric potential, Potassium compounds, Salts, Mercury electrodes.

The differential capacity of the electrical double layer at a mercury-solution interface has been determined for twelve solutions of tenth-normal potassium salts. The results show that there is a strong correlation between the shape of the capacity curves and the solubility of the corresponding mercurous salts. Anion pairs which exhibit the same general solubility relationships (nitrate-perchlorate, carbonate-hydroxide) also exhibit similar capacity curves. The results are used to calculate the surface charge density of the electrical double layer. (Author)

PB 160 636 $3.60

Amherst Coll., Mass.
THERMODYNAMIC PROPERTIES OF THE ELECTRICAL DOUBLE LAYER. I. DIFFERENTIAL CAPACITY OF MERCURY IN AQUEOUS SODIUM FLUORIDE SOLUTIONS AT 25°C. II. IONIC COMPONENTS OF CHARGE IN THE ELECTRICAL DOUBLE LAYER, by David C. Grahame and Barbara A. Soderberg. Technical rept. no. 14 on Contract N8onr-66903. 18 Feb 54, 35p. 4 refs. AD-27 866.

DESCRIPTORS: *Electrical double layer, *Thermodynamics, *Mercury, Water, *Sodium compounds, *Fluorides, Solutions, Ions, Electrochemistry, Electrolytes, Tables.

The differential capacity of mercury in contact with aqueous solutions of sodium fluoride has been studied as a function of concentration. The results show that from the capacity measurements at any one concentration (but preferably a high one) it is possible to calculate the capacity at all others. This result confirms an hypothesis advanced earlier to the effect that in the absence of specific adsorption the differential capacity of the region lying between the metal and the outer Helmholtz plane depends upon the surface charge density of the metal but not upon the concentration of the electrolyte. The results serve as an additional strong confirmation of the theory of the diffuse double layer. They also provide data which can be used for an exacting test of the accuracy of techniques used for the experimental measurement of the differential capacity of the electrical double layer. (Author)

TID-15421 $1.60

Brandeis U., Waltham, Mass.
PHOTOCHEMICAL REACTIONS OF COMPLEX MOLECULES IN CONDENSED PHASE, by Henry Linschitz. Progress rept. 1 May 61-30 Apr 62, on Contract AT(30-1)-2003. 1 Mar 62, 19p.

TID-14956 $1.10

Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF $NbAl_3$. Rept. 1 Jan 62-1 Feb 62, on Contract AT(11-1)-1092. 8 Feb 62, 3p.

Order from GPO $0.30 as
I 19.16:411-C

Geological Survey, Washington, D. C.
TRANSVERSE DISPERSION IN LIQUID FLOW THROUGH POROUS MEDIA. FLUID MOVEMENT IN EARTH MATERIALS, by Eugene S. Simpson. 1962, 30p. Geological Survey Professional Paper 411-C.

DESCRIPTORS: *Liquids, *Fluid flow, Diffusion, *Porous materials, Earth, Materials.

UCRL-10108 $1.75

Lawrence Radiation Lab., U. of California, Berkeley.
A STUDY OF THE KINETICS OF THE REACTION $H+O_2$ BY PARAMAGNETIC RESONANCE, by Norman Marvin Edelstein. Doctoral thesis. Apr 62, 75p. 37 refs.

LA-2696 $0.50

Los Alamos Scientific Lab., N. Mex.
ENTHALPY, DENSITY, AND COEFFICIENT OF THERMAL EXPANSION OF TNT, by Howard H. Cady and William H. Rogers. Rept. on Contract W-7405-eng-36. 11 July 62, 16p. 16 refs.

NYO-10289 $14.00

Yale U., New Haven, Conn.
THE MECHANISM OF OXIDATION OF IRON AND COBALT IN CARBON MONOXIDE CARBON DIOXIDE MIXTURES, by Frederick S. Pettit. Doctoral thesis. May 62, 209p. 89 refs.

EARTH SCIENCES

Order from GPO $0.50 as
I 28.27:8099

Bureau of Mines, Washington, D. C.
USE OF HIGH-SPEED DATA REDUCTION AND PROCESSING IN THE MINERAL INDUSTRY, by Richard F. Hewlett. 1962, 82p. 156 refs. Information Circular 8099.

DESCRIPTORS: *Minerals, *Industry, *Data processing systems, Digital computers, Analog computers, Computers, Programming, Data, Reduction.

The purpose of this Bureau of Mines paper is to provide the mineral industry with current information on high-speed data processing and to illustrate how some of these techniques can be applied to the industry. The need for applying these techniques is generally recognized, but not much information is readily available on specific applications. This paper briefly describes high-speed data processing and reduction equipment in an effort to familiarize the reader with the functions of the equipment. A list and explanation of some of the possible applications of high-speed data processing for the mineral industry are included. A few of these applications are illustrated by the use of specific examples of existing computer programs or processing methods, including their calculation times and costs. (Author)

Order from GPO $0.20 as
I 19.16:500-A

Geological Survey, Washington, D. C.
THE CONCEPT OF ENTROPY IN LANDSCAPE EVOLUTION. THEORETICAL PAPERS IN THE HYDROLOGIC AND GEOMORPHIC SCIENCES, by Luna B. Leopold and Walter B. Langbein. 1962, 20p. 17 refs. Geological Survey Professional Paper 500-A.

DESCRIPTORS: *Hydrology, *Geology, Thermodynamics, *Entropy, Probability, *Inland waterways, Hydraulic research, Drainage.

The concept of entropy is expressed in terms of probability of various states. Entropy treats of the distribution of energy. The principle is introduced that the most probable condition exists when energy in a river system is as uniformly distributed as may be permitted by physical constraints. From these general considerations equations for the longitudinal profiles of rivers are derived that are mathematically comparable to those observed in the field. The most probable river profiles approach the condition in which the downstream rate of production of entropy per unit mass is constant.

Order from GPO $0.15 as
I 19.13:1619-U

Geological Survey, Washington, D. C.
METHODS FOR MEASURING SOIL MOISTURE IN THE FIELD. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES, by A. I. Johnson. 1962, 25p. 216 refs. Geological Survey Water-Supply Paper 1619-U.

DESCRIPTORS: *Soils, *Moisture, Measurement, Hydrology, Agriculture, Forestry.

Evaluates methods for measuring soil moisture and describes the equipment used.

Order from GPO $1.25 as
I 19.16:450-B

Geological Survey, Washington, D. C.
SHORT PAPERS IN GEOLOGY, HYDROLOGY, AND TOPOGRAPHY ARTICLES 1-59. GEOLOGICAL SURVEY RESEARCH 1962. 1962, 145p. 245 refs. Geological Survey Professional Paper 450-B

DESCRIPTORS: *Geology, *Hydrology, *Aerial photography, *Mapping, Geological survey.

Scientific notes and summaries of investigations prepared by members of the Geologic, Water Resources, and Topographic Divisions in the fields of geology, hydrology, topography, and allied sciences.

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Geological Survey, Washington, D. C.
SOME EFFECTS OF THE LARGE TYPES OF AQUATIC VEGETATION ON IRON CONTENT OF WATER. CHEMISTRY OF IRON IN NATURAL WATER, by Eugene T. Oborn and John D. Hem. 1962, 20p. 17 refs. Geological Survey Water-Supply Paper 1459-I.

DESCRIPTORS: *Plants, *Water, *Iron, Soils, Marine biology, Chemical analysis.

Investigation of factors affecting solution of iron in natural water.

NASA N62-12436 $1.10

Lamont Geological Observatory, Columbia U. Palisades, N. Y.
DESIGN AND CONSTRUCTION OF A LUNAR SEISMOGRAPH. Progress rept. no. 11, 1 Jan-31 Mar 62, on Contract NASw-82. [Apr] 62, 7p.

Climatology and Meteorology

NASA N62-12539 $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SOME MEASURED CHARACTERISTICS OF SEVERE STORM TURBULENCE, by Roy Steiner and Richard H.Rhyne. [1961] 25p. 4 refs.

Order from GPO $1.75 as
NAS 1.2:M56

National Aeronautics and Space Administration, Washington, D. C.
PROCEEDINGS OF THE INTERNATIONAL METEOROLOGICAL SATELLITE WORKSHOP, NOVEMBER 13-22, 1961. [1962] 226p. 27 refs.

DESCRIPTORS: *Meteorology, Satellite vehicles, *Satellite vehicle research, Meteorological data, Collecting methods, Processing, Clouds, Storms, *Conferences.

Contents:
Statements of James E. Webb, Harry Wexler, Hugh L. Dryden, Morton J. Stoller, Kaare Langlo, U. Schwarz, Morris Tepper
The current NASA meteorological satellite program
The current USWB meteorological satellite program
The Tiros satellites
Cloudiness associated with large-scale synoptic systems in temperate latitudes
Interpretation of cloud types
Tropical cloudiness, severe storms, and convective cells
Picture gridding
Use of Tiros pictures in current synoptic analysis
Physical measurements and data processing
Application of Tiros data to radiative processes in the atmosphere
Application of radiation data to synoptic analysis and to studies of the general circulation
Differential cooling from satellite observations
Archiving of Tiros data
Supporting meteorological observations
NASA meteorological satellite plans for the future
An operational meteorological satellite system

Geology

RME-4568 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE ARICA AREA, PROVINCE OF TARAPACA, CHILE, by Mario Serrano C. and Erik Klohn H. Dec 60, 12p. 6 refs. Prepared in cooperation with Instituto de Investigaciones Geologicas, Santiago (Chile).

RME-4511 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE CUZCO-AYAVIRI REGION, SOUTHERN PERU, by Lawrence J. Brown and Francisco Cútolo L. Oct 57, 12p. 1 ref. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru)

RME-4517 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE MOQUEGUA-ILO AREA, DEPARTMENT OF MOQUEGUA, PERU, by Lawrence J. Brown, Guillermo Morales S., and Adolfo Ocampo A. Feb 58, 9p. 2 refs. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru)

RME-4521 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE PROVINCES OF CHOTA AND HUALGAYOC, DEPARTMENT OF CAJAMARCA, PERU, by Lawrence J. Brown and Francisco Cútolo L. Dec 57, 8p. 2 refs. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru)

RME-4540 (Rev.) $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE PUNTA ARENAS AREA, PROVINCE OF MAGALLANES, CHILE, by Paul H. Knowles, William A. Bowes and others. Mar 62, 17p. 11 refs. Prepared in cooperation with Instituto de Investigaciones, Geologicas, Santiago, (Chile)

Order from GPO $1.00 as
I 19.16:378-B

Geological Survey, Washington, D. C.
ANALYSIS OF PLASTIC DEFORMATION ACCORDING TO VON MISES' THEORY WITH APPLICATION TO THE SOUTH SILVERTON AREA, SAN JUAN COUNTY COLORADO, by David J. Varnes. 1962, 51p. 35 refs. Geological Survey Professional Paper 378-B.

DESCRIPTORS: *Plasticity, *Deformation, Analysis, *Probability, Colorado, Geological survey, Mining engineering, *Avalanches, *Earthquakes, Geophysics.

TEI-780 $1.00

Geological Survey, Washington, D. C.
PRELIMINARY RESULTS OF A SURVEY FOR THICK HIGH CALCIUM LIMESTONE DEPOSITS IN THE UNITED STATES. POSSIBLE ALASKAN SITES FOR NUCLEAR REACTION EXPERIMENT IN LIMESTONE, by R. E. Davis, W. P. Williams and others. Preliminary rept. Jan 61, 46p. 5 refs.

Order from GPO $1.75 as
I 19.13:1702

Geological Survey, Washington, D. C.
SURFACE WATER SUPPLY OF THE UNITED STATES 1960. PART 1-B. NORTH ATLANTIC SLOPE BASINS, NEW YORK TO YORK RIVER. 1962, 567p. Geological Survey Water-Supply Paper 1702.

DESCRIPTORS: *Water supplies, Hydrology, Geological survey, Inland waterways, New York, York River.

Order from GPO $1.50 as
I 19.13:1704

Geological Survey, Washington, D. C.
SURFACE WATER SUPPLY OF THE UNITED STATES 1960. PART 2-B. SOUTH ATLANTIC SLOPE AND EASTERN GULF OF MEXICO BASINS, OGEECHEE RIVER TO PEARL RIVER. 1962, 465p. Geological Survey Water-Supply Paper 1704.

DESCRIPTORS: *Water supplies, Hydrology, Geological survey, Gulf of Mexico, Inland waterways.

Order from GPO $2.00 as
I 19.13:1711

Geological Survey, Washington, D. C.
SURFACE WATER SUPPLY OF THE UNITED STATES 1960. PART 7. LOWER MISSISSIPPI RIVER BASIN. 1962, 594p. Geological Survey Water-Supply Paper 1711.

DESCRIPTORS: *Water supplies, Mississippi, *Inland waterways, Hydrology, Deltas, Geological survey.

Order from GPO $2.00 as
I 19.13:1708

Geological Survey, Washington, D. C.
SURFACE WATER SUPPLY OF THE UNITED STATES 1960. PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS. 558p. Geological Survey Water-Supply Paper 1708.

DESCRIPTORS: *Water supplies, Hydrology, Geological survey, Hudson Bay, Inland waterways.

Oceanography

TID-14772 $11.00

Academy of Natural Sciences, Philadelphia, Pa.
SAVANNAH RIVER BIOLOGICAL SURVEY, SOUTH CAROLINA AND GEORGIA, MAY-JUNE AND AUGUST-SEPTEMBER 1960 FOR THE E. I. DU PONT DE NEMOURS AND COMPANY, SAVANNAH RIVER PLANT. Rept. on Contract AT(07-2)-1. Sep 61, 142p.

PB 160 648 $11.50

Bege, J. R. M., Co., Arlington, Mass.
CATENARY PROBLEMS ASSOCIATED WITH DEEP MOORING OPERATIONS, by R. M. Langer. Rept. on Contract NObs-74310. May 59, 154p.

DESCRIPTORS: *Mooring, Ships, Naval vessels, Handling, *Anchors, Marine engineering, Mathematical analysis, Wire, Cordage, Ocean bottom

Deep water mooring is difficult and expensive enough to justify a careful review of the shapes assumed by the flexible chains or cables used in mooring operations. The properties of these curves have been formulated in a new way particularly suited to problems which arise before and during mooring operations.

TID-14390 $1.60

Chicago U., Ill.
RESEARCH ON THE MARINE GEOLOGY AND BIOLOGY OF TOMALES BAY, CALIFORNIA. Progress rept. on Contract AT(11-1)-1019. 1 Jan 62, 15p.

ENGINEERING

PB 160 647 $9.10

Bureau of Yards and Docks, Washington, D. C.
GENERAL HANDBOOK. Engineered Performance Standards, Public Works Maintenance. Aug 58, rev. Dec 59, Feb 61. 108p. NAVDOCKS P-701.

DESCRIPTORS: *Handbooks, *Engineering, Standards, Labor, *Maintenance, Management engineering, Job analysis.

TID-15622 $1.10

General Mills Electronics Group, Minneapolis, Minn.
LETTER PROGRESS REPORT FOR MARCH, 1962, on Contract AT(11-1)-401. 12 Apr 62, 10p.

TID-15246 $28.50

Hanford Atomic Products Operation, Richland, Wash.
GUIDES. Volumes 1 and 2. Mar 62, 735p. 35 refs. HWS-10003-1-T, HWS-10003-2-T.

PB 181 336 $0.75

Williams, Clyde and Co., Columbus, Ohio.
METAL-URETHANE SANDWICHES AS ENGINEERING MATERIALS. AN EVALUATION OF COMMERICAL APPLICATIONS, by Robert E. Greenlee and William A. Losoncy, Jr. Rept. on Contract CC 4569. [1962] 27p. 22 refs.

DESCRIPTORS: Engineering, Materials, Metals, *Urethanes, *Sandwich panels, *Sandwich construction, *Honeycomb cores, Foams, *Foamed metals, Physical properties, Economics.

Some general advice is given on the engineering properties of urethane sandwiches. Properties of the urethane foam are listed that make it attractive as a sandwich core. The economic advantages of metal-urethane sandwiches are pointed out. Some representative applications are described. General information on how sandwiches are made is reviewed. It is concluded that metal-urethane sandwiches, when properly utilized, should give excellent service with substantial savings in material and labor costs. (See also PB 159 425-1 and 2)

Aeronautical Engineering

PB 160 660 $9.10

Courtney and Co., Philadelphia, Pa.
AN ACTIVITY ANALYSIS OF THE POSITION IN A HIGH ACTIVITY AIR TRAFFIC CONTROL TOWER, by C. Glenn Davis, Robert Kerle and others. Rept. on Contract FAA/BRD-40. 30 June 60, 108p. 2 refs. Rept. no. 39.

DESCRIPTORS: *Airport control towers, *Air traffic control systems, Communication systems, Air traffic controllers, *Human engineering, Training.

Activity analyses of controllers in a high activity air traffic control tower (New York International Airport) were performed to describe in detail the duties of operating controllers. The activity analysis data were co collected primarily by means of time sampling, in which a controller's activity was recorded at 10-second intervals. Over 1000 observations were made on each position under heavy traffic in VFR weather conditions for the cab positions and under IFR weather conditions for the IFR room positions. Supplementary data were collected at night and under low traffic conditions. All control positions were observed including the Ground, Local, Approach, and Departure Controllers, as well as Arrival Flight Data, Clearance Delivery, and Cab Flight Data. A unique characteristic of the data collection was the use of functional categories which were in terms of the meaning of the controller's activity for the air traffic control system. Other data were collected through interviews, timing of activities, and flight following. The activity analysis data indicated, for the several conditions of observation, the percentage of time each position spent in each type of activity. These data were discussed, interpreted, and comparisons were drawn among the positions. Process charts are presented which describe each activity frequently required in dealing with both IFR anf VFR aircraft.

PB 160 659 $10.50

Courtney and Co., Philadelphia, Pa.
THE CONTROLLER IN POSITIVE AND TRADITIONAL CONTROL, by C. Glenn Davis and Wallace H. Wallace. Technical rept. on Contract FAA/BRD-301. 23 Sep 61, 135p. 14 refs. Rept. no. 58.

DESCRIPTORS: *Human engineering, *Air traffic controllers, *Air traffic control systems, Communication systems.

The findings may be briefly summarized as follows: (1) Although the number of aircraft being controlled was higher and each of the aircraft received more service than under Traditional Control, Positive Control did not significantly increase the controllers' communication workload, i.e., conversations with pilots and other controllers. (2) The amount of coordination required by the Pathfinder sector was somewhat higher. Much of this increase is probably the result of the use of a tracker position to assist the radar controller. (3) The beacon hand-offs were considerably more efficient than the radar hand-offs in terms of the amount of time they required. (4) The comparison of the Chicago and Indianapolis data indicates that the tracker position may not be essential. The Chicago sector seems to function very well without it, and an analysis of activities of the tracker indicates that many of these manual functions may be adequately performed by mechanical tracking devices that are presently available as "off-the-shelf" items.

PB 160 603 $4.60

Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.
EVALUATION OF A HYDROSKI INSTALLATION ON THE YC-123E PANTOBASE AIRCRAFT, by Robert L. Willoughby, Berkeley Atkinson, and George Dwyer. Rept. for Aug 55-Dec 56. Apr 57, 49p. WADC Technical note 57-23; AD-110 729.

DESCRIPTORS: *Hydro-skis, *Landing gear, *Ski landing gear, Installation, Water, Snow, Take-off, Flight testing, Aircraft.

The Pantobase arrangement was developed in an effort to produce a landing gear system in one package which would provide independence in a selection of landing surface for any aircraft so equipped. The flight tests generally proved the success of this design approach with respect to water and snow operations. The aircraft was able to consistently operate from water at a maximum gross weight of 49,000 pounds which is 3,600 pounds under the maximum takeoff gross weight of 52,600 pounds. A range of fresh water conditions from glassy to a combination of 8-10 inch chops and 2-3 foot swells existed during the tests conducted. In snow operation the aircraft in general performed successfully through the entire gross weight range including an overweight loading of 55,165 pounds. The aircraft under the proper combination of snow conditions and elevator angle will porpoise, which at times resulted in contact of the ski bottom at the forward end with the underlying surface.

Chemical Engineering

AD-258 291 $4.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
A LABORATORY METHOD FOR EVALUATING CHEMICAL IGNITERS FOR HYDROCARBONS, by Julius B. Miller and Werner W. Beyth. Rept. for May-Aug 60, on Flame and Incendiary Research. May 61, 45p. 3 refs. Technical rept. CRDLR 3068.

DESCRIPTORS: Hydrocarbons, Oxidizers, Heat of reaction, Calorimeters, *Igniters, Fuels, Hexanes, Chemical reactions, Fuel thickeners, *Flame thrower fuels, Ignition, Chromyl radicals, Nitrates, Test equipment, Chlorides, Chromic acid, Laboratory equipment, Test methods, Salts, Pentanes, Benzenes.

A calorimeter that measures the preignition heat of reaction between chemical oxidizers and hydrocarbon fuels was used in this investigation. The chemical oxidizers used were the chromyl salts; i.e., chromyl chloride, chromyl nitrate, and a mixture of chromyl chloride and chromic acid anhydride. The hydrocarbons used were n-hexane, hexene-1, 2-methylpentane, and benzene. The investigation was conducted in a randomized factorial design so that the number of experimental runs was kept to a minimum. A satisfactory laboratory method for evaluating chemical igniters for hydrocarbon fuels has been found. The best hydrocarbon for this screening test is n-hexane. (Author)

TID-15975 $7.60

Minnesota U., Minneapolis.
TWO PHASE FLOW THROUGH AN APERTURE, by George R. Gavalas. Master's thesis. Rept. on Contract AT(11-1)-926. May 62, 76p. 28 refs.

PB 160 661-2 $6.60

Office of Saline Water, Dept. of the Interior, Washington, D. C.
BID FOR A 250,000 GALLON PER DAY FREEZE DEMINERALIZATION SEA WATER CONVERSION PLANT AT WRIGHTSVILLE BEACH, NORTH CAROLINA. Rept. on Contract [OSW] 14-01-0001-241. 30 Apr 62, rev. 4 May 62, 11 May 62, 15 May 62, 29 May 62, 31 May 62, 20 June 62, 28 June 62, and 3 July 62, 61p. Bid for Specifications no. 241.

DESCRIPTORS: *Sea water, *Desalination, Water supplies, Distilling plants, Freezing, Purification, Specifications, North Carolina, Design, Construction, Industrial equipment.

PB 160 661-1 $22.25

Office of Saline Water, Dept. of the Interior, Washington, D. C.
SPECIFICATION DOCUMENTS, CONDITIONS DETAIL SPECIFICATIONS AND SMALL DRAWINGS FOR A 250,000 GALLON PER DAY DEMINERALIZATION SEA WATER CONVERSION PLANT AT WRIGHTSVILLE BEACH, NORTH CAROLINA. Rept. on Contract OSW 14-01-0001-241. 30 Apr 62, 443p. 4 refs. Specifications no. 241.

DESCRIPTORS: *Sea water, *Desalination, Water supplies, Distilling plants, Freezing, Purification, Specifications, Design, Industrial equipment, Construction, Foundations (Structures), Soils, North Carolina.

PB 160 661-3 $6.60

Office of Saline Water, Dept. of the Interior, Washington, D. C.
SPECIFICATIONS FOR A 250,000 GALLON PER DAY FREEZE DEMINERALIZATION SEA WATER CONVERSION PLANT AT WRIGHTSVILLE, NORTH CAROLINA. Rept. on Contract OSW 14-01-0001-241. [1962] 66p. 4 refs. Specifications no. 241, appendices A, B, C, D, E, and F.

DESCRIPTORS: *Sea water, *Desalination, Water supplies, Distilling plants, Freezing, Purification, Foundations (Structures), Soils, Specifications, North Carolina.

Contents:
App. A. Soils Report Documents
App. B. Transportation
App. C. Local Factors

App. D-1. Physical Properties of Local Sea Water Samples
2. Chart Data - Local Sea Water
3. Reports of Sea Water Analysis
4. Tide Data
5. Characteristics of Sea Water
App. E. Permits
App. F. Asphaltic Membrane Lining

IDO-14564 $1.25

Phillips Petroleum Co., Idaho Falls
AN EVALUATION OF FOUR PROCESSES FOR RECOVERING URANIUM FROM ZIRCONIUM FUELS AT THE IDAHO CHEMICAL PROCESSING PLANT, by P. Burn. Rept. on Contract AT(10-1)-205. 27 Apr 62, 62p. 32 refs.

TID-15733 $2.60

Savannah River Lab., Aiken, S. C.
FLOWSHEETS AND SUPPLEMENTARY DATA FOR THE HEAVY WATER PLANT DESCRIBED IN CHEM. ENG. PROG. 58, 53-61, No. 4, APRIL 1962, by J. F. Proctor and V. R. Thayer. Rept. on Contract AT(07-2)-1. 13 May 62, 22p.

Civil Engineering

PB 160 610 $5.60

Army Engineer Waterways Experiments Station, Vicksburg, Miss.
FIELD EVALUATION OF CALCIUM ACRYLATE (WES TEST LANES 1 AND 2), by G. R. Kozan. Rept. on Soil Stabilization. June 57, 60p. 6 refs. Technical rept. no. 3-455, rept. 1; AD-135 305.

DESCRIPTORS: *Soils, Stabilization, *Acrylic resins, *Calcium, Ion exchange, Polymerization, Traffic.

Field studies of calcium acrylate, a chemical which is capable of forming a strong bond in a wet, fine-grained soil by ion exchange reaction and subsequent polymerization, were conducted to further investigate its suitability as a soil stabilizer. Two test lanes consisting of

low-bearing subgrades surfaced with calcium-acrylate-treated soil were constructed and traffic-tested at a variety of wheel loads up to 26,000 lb. Traffic performance data at WES and also data obtained from previous ERDL test sections were analyzed, studied, and compared with existing flexible pavement design criteria. Investigation indicated that small quantities of calcium acrylate (4 to 6.4%) in a short time (4 to 6 hours) imparted significant strength to lean clay at water contents at which the untreated soil possesses little or no bearing capacity. Conventional incorporation and compaction techniques utilized in constructing the lanes were sufficiently satisfactory to warrant use in future field studies. (Author)

TID-15244 $23.50

Hanford Atomic Products Operation, Richland, Wash.
ARCHITECTURAL AND CIVIL STANDARDS. 494p. HWS-10000-T.

Electrical and Electronic Engineering

PB 160 655 $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
THE SPIRALLED WAVEGUIDE TRAVELING-WAVE SLOT ANTENNA, by Raymond Justice. Rept. on Contract AF 33(616)3353. 30 Mar 56, 16p. 8 refs. Rept. 667-6; AD-107 993.

DESCRIPTORS: *Helical antennas, *Slot antennas, Design, Waveguides, *Antenna radiation patterns, Polarization.

Spiral antennas are discussed with particular attention to the spiralled waveguide slot antenna. The design of such antennas is considered and some radiation patterns of a model are presented. (Author)

PB 160 581 $2.60

Battelle Memorial Inst., Columbus, Ohio.
THERMOELECTRIC POWER GENERATION AND RELATED PHENOMENA, by T. S. Shilliday. Bimonthly rept. no. 8, 7 Mar-7 May 60, on Contract NObs-77034. 7 July 60, 22p. 7 refs. AD-245 861.

DESCRIPTORS: *Thermoelectricity, *Electric power production, Materials, Electrical properties, Aluminum compounds, Gallium compounds, Arsenides, Heat transfer, Transport properties, Metallurgical analysis, Metallic compounds, Alloys.

Alloy ingots of nominal molar composition, 80GaAs-20AlAs, were prepared by zone leveling and crystallization from solution. Electrical properties, resistivity, and Hall coefficient measurements at room temperature are tabulated and compared with measurements made on specimens taken from a nominal 90-10 composition. Modifications were made in the ac measuring-circuit for the measurement of thermal diffusivity of InSb. The data obtained led to consistent values of thermal diffusivity which do not agree with those obtained by Becker (J. H. Becker and I. J. Sochard, Bull. Am. Phys. Soc. Ser II, Vol. 4, page 3, 1959), who used the same method, or with values calculated from published values of thermal conductivity. Studies were continued to determine whether the differences between the Hall coefficients determined adiabatically and those determined isothermally are on the order of ZT, where Z is the thermoelectric figure of merit of the material.

PB 155 247 $2.60

Bell Telephone Labs., Inc. [Whippany, N. J.]
MICROWAVE SOLID-STATE DEVICES, by B. G. Cohen, J. H. Forster, and R. C. Swenson. Interim rept. no. 1, 1 Apr-30 June 60, on Contract DA 36-039-sc-85325, continuation of Contract DA 36-039-sc-73224. 30 Aug 60, 22p. 7 refs. AD-245 775.

DESCRIPTORS: *Diodes, Crystals, *Semiconductors, Gallium, Arsenides, Electrical properties, Resistance, Reduction, Diffusion, *Microwave equipment, Tests, Manufacturing methods, Silicon, Design.

A review of the progress in device technology related to production of gallium arsenide varactor diodes is given. Preparation of high conductivity gallium arsenide, diffusion of impurities, and contacting techniques are discussed. The results are reviewed in terms of the special electrical requirements of varactor diodes.

Possible sources of excess resistance in diffused silicon mesa diodes were previously discussed. Among these, most highly suspect was the diaphragm-mesa contact. Experiments are described which indicate the source of excess resistance, and in particular show that as much as two-thirds of the excess resistance can arise in the diaphragm itself. Practical fabrication techniques minimizing this excess resistance are given. (Author)

PB 157 295 $3.60

Bell Telephone Labs., Inc. [Whippany, N. J.]
MICROWAVE SOLID-STATE DEVICES, by A. E. Bakanowski, B. G. Cohen and others. Interim rept. no. 3, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85325, continuation of Contract DA 36-039-sc-73224, 34p. 6 refs; AD-252 952.

DESCRIPTORS: *Diodes, *Semiconductors, *Microwave equipment, Manufacturing methods, Gallium compounds, Microwave amplifiers, Measurement, Germanium, Temperature, Impedance, Arsenides, Silicon.

A brief review of progress in fabrication of diffused gallium arsenide varactor diodes is given. A specific diode structure now in process of fabrication is described and experimental results involving the component processing steps are discussed. The results of noise figure measurements on a group of high performance diffused silicon mesa diodes operating at room and lower temperatures are reported. These results are compared with those obtained using gallium arsenide point contact and diffused germanium mesa diodes, and shown to be closely comparable, even at lower temperatures. Reasons for the improved silicon

diode performance are discussed. Finally, some initial measurements of varactor diode impedance as a function of temperature are presented. The measurements, made at 9.8 kmc, require further refinement before accurate determination of diode cut-off frequency at temperatures as low as 90 K can be made. The experimental techniques and sources of error are discussed. (Author) (See also PB 156 226)

PB 160 630 $2.60

Brandeis U., Waltham, Mass.
DYNAMICS OF ELECTRON BEAMS AND PLASMAS, by Eugene P. Gross. Technical note no. 5 on Contract AF 49(638)27. [1959] 29p. 48 refs. AFOSR-TN-59-102; AD-253 127.

DESCRIPTORS: *Plasma physics, *Electron beams, Electronic circuits, Electrical properties, Mechanical properties, Electromagnetic properties, *Symposia, Wave guides, Magnetohydrodynamics.

This report discusses various levels of description of electron beams and plasmas, their limitations, and the type of information that they may give. No serious attempt is made to critically evaluate what positive results have been achieved in concrete investigations. Attention is focussed almost entirely on the ionized gas itself rather than on the coupling with external systems. Because of this, very little light is shed on the theory of electron devices. If the ionized gas is to be used as a circuit element, it is important to understand some of its properties. (Author)

PB 181 333 $0.75

Bureau of Naval Weapons, Washington, D. C.
AMPLIFIER, 200 WATT McINTOSH MI 200A, MI 200B, AND MI 200AB. BuWeps-BuShips Calibration Program. 5 Feb 62, 25p. Standards Lab. Instrument Calibration Procedure AA-03 (Rev. 1).

DESCRIPTORS: *Power amplifiers, Amplifiers, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a 200-watt, low distortion power amplifier.

PB 181 327 $0.50

Bureau of Naval Weapons, Washington, D. C.
AUDIO LEVEL INDICATOR: WEINSCHEL ENGINEERING IN-1. BuWeps-BuShips Calibration Program 3 Mar 62, 13p. Standards Lab. Instrument Calibration Procedure GD-03 (Rev. 1).

DESCRIPTORS: Electronic equipment, *Voltmeters, *Tuned amplifiers, Amplifiers, Audiofrequency, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Weinschel Engineering IN-1 Audio Level Indicator, which is designed specifically to measure ratios of RF power levels when used with the Weinschel AF Substitution attenuation measurement system. The Test Instrument is essentially an electronic voltmeter which includes a variable, high gain, medium band amplifier and a panel meter whose scales are calibrated to indicate directly in RF db or SWR when used with a square law detector such as a crystal diode or barretter.

PB 181 329 $1.75

Bureau of Naval Weapons, Washington, D. C.
BOONTON RADIO CORPORATION 260-A Q METER, 513-A AND 518-A Q STANDARDS AND TYPE 103-A INDUCTORS. BuWeps-BuShips Calibration Program. 27 Nov 61, 60p. Standards Lab. Instrument Calibration Procedure AZ-07 (Rev. 1).

DESCRIPTORS: *Q meters, *Coils, Calibration, Instrumentation, Instruction manuals.

PB 181 334 $0.50

Bureau of Naval Weapons, Washington, D. C.
BOURDON TUBE PRESSURE GAGES, 30 TO 12,140 PSIG, USING THE RUSKA DEAD WEIGHT INSTALLATION. BuWeps-BuShips Calibration Program. 8 Feb 62, 14p. Standards Lab. Instrument Calibration Procedure MP-03.

DESCRIPTORS: *Pressure gages, Calibration, Instrumentation, Instruction manuals.

PB 181 326 $0.75

Bureau of Naval Weapons, Washington, D. C.
CAVITY FREQUENCY METERS. 2.60 THROUGH 26.50 Gc (KMc), STANDARD CAVITY TECHNIQUE. BuWeps-BuShips Calibration Program. 3 Feb 62, 18p. Standards Lab. Instrument Calibration Procedure GF-02.

DESCRIPTORS: Waveguides, *Frequency meters, Calibration, Instrumentation, Instruction manuals.

PB 181 332 $0.50

Bureau of Naval Weapons, Washington, D. C.
GENERATORS, SIGNAL, AN/USM-27, AN/USM-27A, OR AN/USM-27B. BuWeps-BuShips Calibration Program. 5 Oct 61, 17p. Standards Lab. Instrument Calibration Procedure AG-61.

DESCRIPTORS: *Signal generators, *Pulse generators, Calibration, Instrumentation, Instruction Manuals, Generators.

The Test Instrument is a general purpose pulse generator which provides both positive and negative output pulses and positive and negative synchronizing pulses. The output pulses are variable in amplitude and duration and can be delayed in relationship to the synchronizing pulse.

PB 181 335 $0.75

Bureau of Naval Weapons, Washington, D. C.
KLYSTRON POWER UNIT, POLARAD KX-B, AND MICROWAVE SIGNAL SOURCES, POLARAD SSS, SSM, SSM-A, SSX, OR SSX-A. BuWeps-BuShips Calibration Program. 10 Oct 61, 26p. Standards Lab. Instrument Calibration Procedure GG-04 (Rev. 1).

DESCRIPTORS: *Klystrons, *Power supplies, *Microwaves, *Signals, Sources, Signal generators, Calibration, Instrumentation, Instruction manuals.

PB 181 330 $0.50

Bureau of Naval Weapons, Washington, D. C.
TRANSISTOR TEST SET TS-1100/U. BuWeps-BuShips Calibration Program. 17 Feb 62, 16p. Standards Lab. Instrument Calibration Procedure AY-09.

DESCRIPTORS: *Transistors, *Test sets, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a transistor tester, which will measure beta, in the range from 10 to 100, and I_{CO}, from 1 to 50 microamperes, of certain types of transistors as listed in the instruction manual.

PB 181 331 $0.50

Bureau of Naval Weapons, Washington, D. C.
WAVEMETER-OSCILLATOR OAP, OAP-1, OAP-1a. BuWeps-BuShips Calibration Program. 26 Feb 62, 16p. Standards Lab. Instrument Calibration Procedure AQ-18.

DESCRIPTORS: *Wavemeters, *Frequency meters, *Oscillators, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a combined frequency meter and oscillator having a frequency range from 150 to 230 Mc for the OAP and OAP-1, and from 150 to 275 Mc for the OAP-1a. An output voltage is provided for calibarting an external oscilloscope, and a circuit is included for measuring the power output oa a radar set.

PB 181 328 $0.75

Bureau of Naval Weapons, Washington, D. C.
WEINSCHEL ENGINEERING ATTENUATION CALIBRATOR, BA-5. BuWeps-BuShips Calibration Program. 17 Feb 62, 25p. Standards Lab. Instrument Calibration Procedure GA-03.

DESCRIPTORS: *Amplifiers, *Tuned amplifiers, Attenuation, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a high gain, narrow band amplifier tuned to 1000 cps, and includes a precision variable attenuator and output indicator. It is typically applied in RF attenuation measurement systems using an audio substitution technique.

PB 160 580 $2.60

David Sarnoff Research Center, Princeton, N. J.
THERMOELECTRIC MATERIALS FOR POWER CONVERSION, by B. Abeles, K. L. Cheng and others. Quarterly progress rept. no. 6, 1 May-31 July 60, on Contract NObs-77057. 15 Aug 60, 30p. 10 refs. AD-245 858.

DESCRIPTORS: *Thermoelectricity, *Electric power production, *Semiconductors, Tellurides, Silicides, Materials, Alloys, Transition elements, Intermetallic compounds, Electrical properties, Diffusion, Silver compounds, Germanium, Silicon.

This report describes materials research on ternary compounds and transition metal silicides together with high temperature thermal diffusivity measurements on $AgSbTe_2$, Ge and Si. (See also PB 160 579)

PB 160 629 $5.60

Device Development Corp., Weston, Mass.
HALL EFFECT DEVICE INVESTIGATION. Final engineering rept. 1 July 58-28 Feb 59, on Contract NObsr-72823. [1959] 51p. 15 refs. Rept. no. 1008; AD-217 483.

DESCRIPTORS: *Hall effect, *Generators, Analysis, Frequency, High frequency, Temperature, Noise (Radio), Magnetic fields, Semiconductors.

A detailed investigation is presented of Hall generators obtained from 3 manufacturers (Westinghouse, Ohio Semiconductor and Siemens-Halske) in order to determine the properties of these generators with respect to high frequency response, noise, linearity, temperature dependence, Ettinghausen effect, and other pertinent properties. In general, it was found that the devices studied had flat frequency characteristics up to at least 30 mc, had excellent low noise performance, were quite linear, and were subject to the theoretically expected deviations with temperature. The Ettinghausen effect was found to be small. (Author)

PB 160 618 $1.60

Electronic [Tech.] Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
TESTING FOR RELIABILITY, by Larry D. Smith. Rept. on Electronic Component Operational Development. June 57, 16p. WADC Technical note 57-177; AD-142 062.

DESCRIPTORS: *Electronic equipment, Airborne, *Reliability, *Statistical tests.

A statistical test procedure is described for the acceptance of electronic equipment on a reliability basis. Between the points representing complete failure and perfection, a line is drawn separating reliable and unreliable operation. Data are plotted on a graph where the barrier line is shown and the regions of unreliable and reliable operation are indicated. Limits of the maximum number (U) and the least number (L) of failures are chosen to give the desired confidence that any point plotted outside the limit gives the required proof that the equipment does or does not meet the reliability requirement. The necessary mean time between failures (M_O) is computed from $R = e^{-T/M_O}$,

where R is the reliability as a probability of failure-free operation, and T is the time in hours of desired failure-free operation. A 95% confidence level is suggested as a good compromise. The limits U and L are best found by use of statistical tables but can be computed from $U = \frac{t}{Mo} + 1.64\sqrt{\frac{t}{Mo}}$ and $L = \frac{t}{Mo} - 1.64\sqrt{\frac{t}{Mo}}$. The test is restricted to equipment that has been debugged before being placed on test and with which no wearout failures should occur.

PB 160 635 $3.60

[Food Machinery and Chemical Corp.] Buffalo, N. Y.
STUDIES OF AN OXYGEN ELECTRODE FOR A LONG-LIFE PRIMARY CELL, by Michael McCarthy and Ralph Bloom, Jr. Rept. on Contract Nonr-835(00). 1 May 53, declassified 15 May 60. 33p. Technical rept. PC-1; AD-11 840.

DESCRIPTORS: *Primary batteries, Electrodes, *Oxygen electrodes, *Hydrogen compounds, *Peroxides, Electrochemistry.

An investigation was made of the use of O from H_2O_2 in the National Carbon air cell and of the effect of elevated temperature and increased electrolyte concentration on the performance of this cell. Theoretical aspects of this problem were considered. The construction of the CGS500 air cell is discussed and the voltage-measurement and current-measurement and cell-loading circuits are described. The cell consisting of the electrode assembly and approximately 4-1 of electrolyte in a 4-1 beaker was placed on an electric hot plate. Readings were taken as the cell was heated and as it cooled. The following data were obtained: (1) open-circuit voltage of the cell, (2) open-circuit voltage of reference vs O electrode, (3) current drawn from the cell, (4) cell Zn vs O voltage for these currents, (5) reference Zn vs O voltage for these currents, and (6) temperature of the cell. Test results indicated that operation at high temperatures was superior to room-temperature operation. High-temperature operation reduced polarization and internal resistance of a cell utilizing an O electrode. The use of highly concentrated electrolyte also reduced polarization. There was an optimum electrolyte concentration for minimum internal cell resistance for a given operating temperature. It was concluded that the use of concentrated electrolyte and operation at elevated temperature can result in increased capacity of the O electrode.

DC-59-6-15 $19.75

General Electric Co., Cincinnati, Ohio.
MAINTENANCE HANDBOOK D102A CONTROL SYSTEM, by W. T. Miller and M. H. Ferguson. Preliminary rept. on Contract AT(11-1)-171. 15 June 59, declassified 10 Aug 61. 310p.

DC-58-1-162 $1.10

General Electric Co., Cincinnati, Ohio.
VOLTAGE CONTROLLED VARIABLE FREQUENCY WAVEFORM GENERATOR, by E. F. Fortner. Rept. on Contract AT(11-1)-171. 21 Jan 58, 7p.

PB 160 642 $13.50

Hoffman Electronics Corp. [El Monte] Calif..
SURVEY OF STATE-OF-THE-ART FUEL CELL DEVELOPMENT, by Joseph S. Smatko, J. B. Chrisney, and Charles C. Cook. Final rept. Parts A and B on Air Force World-Wide Communication System, 480L, Subcontract to Contract AF 30(635)12857. Dec 59, 200p. 446 refs. AD-248 428.

DESCRIPTORS: *Fuel cells, Electric potential, Hydrocarbons, Hydrogen electrodes, Design, Oxygen electrodes, Ion exchange, Solar energy, Membranes, Effectiveness, Oxidation-reduction reactions, Bibliography.

General descriptions are included for the following types of fuel cells: hydrogen-oxygen systems, hydrocarbon systems, indirect or redox types, consumable electrode types, fused electrode types (direct fuel consumption and thermally regenerative), ion exchange membrane cells, and types related to 2 or more of these. Descriptions of currently active work performed by various technical organizations with supplementary illustrative tables, figures, and an extensive bibliography are also presented. Pertinent articles in the literature have been abstracted and also included. Several promising systems were projected to a common base (2000 KW.-1000 hours) with anticipated technical design improvements in the next few years, and a comparison prepared in terms of characteristic performance. Cyclic and regenerative systems are identified for cyclic use, as could be applied to solar energy conversion systems. (Author)

PB 160 656 $6.60

Hughes Aircraft Co., Culver City, Calif.
S-BAND LOW-NOISE BACKWARD-WAVE AMPLIFIER, by W. M. Mueller and J. Y. Wada. Quarterly progress rept. no. 8 (Final) 20 Aug 57-30 June 59, on Contract DA 36-039-sc-74908. [1959] 64p. 12 refs. AD-231 135.

DESCRIPTORS: *Backward-wave amplifiers, Design, *Electron tubes, *Microwave equipment, S-band, *Amplifiers.

An investigation of the Hughes low-noise gun was carried out and resulted in an understanding of the physical conditions necessary for the operation of this gun. Density-function calculations were performed for noise parameters on a linearly accelerated stream approximating that of the Hughes low-noise gun. A new conclusion reached as a result of these calculations was that low-noise microwave tubes should be practical at much higher frequencies than heretofore thought possible. A study of backward-wave-amplifier circuit parameters was performed; as a result, a design was evolved which should produce a flatter noise-figure versus frequency characteristic than any obtained thus far.

TID-15789 $6.60

Kansas U., Lawrence.
COMPOSITE CHARACTERISTIC OF TWO TUNNEL DIODES IN SERIES, by Felix A. Spies. Master's thesis. May 62, 67p. 11 refs.

NASA N62-12598 $4.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RADIATION EFFECTS OF 40 AND 440 MEV PROTONS ON TRANSISTORS, by William C Hulten. [1962] 42p.

PB 158 185 $10.10

Microwave Lab., Stanford U., Calif.
THE CYCLOTRON-RESONANCE OSCILLATOR, by K. K. Chow. Technical rept. on National Science Foundation Grant 15011. Apr 61, 127p. 24 refs. M. L. rept. no. 800.

DESCRIPTORS: *Backward-wave oscillators, Oscillators, *Cyclotrons, Resonance, Construction, Operation, *Microwave oscillators, Electron beams.

The cyclotron resonance oscillator is a new device for the generation of microwave signals. It employs a low energy electron beam traveling with a periodic trajectory and a circuit which propagates electromagnetic waves at a phase velocity faster than that of light. The periodic motion of the electrons as viewed along the direction of circuit-wave propagation contains may space harmonics propagating at different velocities, one of which will be traveling approximately in synchronism with the circuit wave. Cumulative interaction between this space harmonic and the circuit wave is therefore possible. This is physically possible because, in one cycle of the variation of rf fields, the electrons can be made to complete one full cycle of motion so that they will remain in the same rf phase throughout the motion. Therefore, a resonance phenomenon between the electrons and the circuit waves is exhibited. The basic physical principle of operation is first dealt with, followed by a chapter describing experimental tubes and results obtained thereform. A small-signal analysis is also described in this report.

NASA N62-12452 $8.60

Minneapolis-Honeywell Regulator Co. [Minn.]
ADAPTIVE STATE VECTOR CONTROL. SECTION 5: COMPUTATIONAL SOLUTION OF OPTIMAL CONTROL PROBLEMS, by Y. C. Ho and Piero B. Brentani. Final rept. pt. 5, on Contract NASr-27. Mar 62, 94p. 17 refs. MH MPG rept. 1529-TR5.

NASA N62-12450 $2.60

Minneapolis-Honeywell Regulator Co., Minn.
ADAPTIVE STATE VECTOR CONTROL. SECTION 6: THE THEORY OF AVERAGE POWER OPTIMAL CONTROL OF LINEAR SYSTEMS, by A. E. Pearson. Final rept. pt. 6, on Contract NASr-27. 15 Mar 62, 30p. 2 refs. MH MPG rept. 1529-TR6.

PB 160 520 $1.60

Navy Electronics Lab., San Diego, Calif.
MATERIALS RESEARCH IN AND PRACTICAL APPLICATIONS OF ELECTROLUMINESCENCE, by R. B. Nehrich, Jr. and R. K. Logan. 30 June 60, 13p. 1 ref. Research and development rept. 978; AD-254 546.

DESCRIPTORS: *Lighting equipment, Luminescence, Luminescent materials, Phosphors, Dielectrics, Coatings, Glass, Plastics, Conductors, Capacitors, Electrodes, Light transmission, Display systems, Manufacturing methods, Materials, *Lighting systems, Electrical conductance.

Research was conducted to determine the best techniques and materials for constructing electroluminescent cells for use in military equipments. Several applications were shown to be feasible, including training aids, visual read-outs, and various indicators and displays. Considerable improvements were achieved in fabrication methods, including the use of copper-clad epoxy Fiberglas boards for the substrate layer of the cell. (Author)

PB 155 238-2 $19.75

Office of Naval Research, Washington, D. C.
INVESTIGATION OF NONLINEAR CONTROL SYSTEMS. PART 2: DISCONTINUOUS CONTROL SYSTEMS, by Nicholas Minorsky, R. Conti, and G. Sansone. Mar 61, 326p. 8 refs.

DESCRIPTORS: *Control systems, *Nonlinear systems, Relays, Polarized relays, Data, Sampling, Feedback, Modulation, Integral transforms, Theory, Stability.

Contents:
Relay control systems
Generalities on sample data systems
Discrete transformation of Laplace
Open sample data systems (CSDS)
Closed sampled data systems (CSDS)
Optimizing control (earlier theory)

PB 160 593 $8.60

RCA Industrial Tube Products, Lancaster, Pa.
25 WATT CERAMIC BEAM POWER TETRODE, by F. W. Peterson and G. A. DeLong. Interim final rept. 23 May 58-30 Sep 59, on Contract DA 36-039-sc-78032. 30 Sep 59, 97p. AD-235 195.

DESCRIPTORS: *Beam power tubes, *Tetrodes, Ceramic materials, Design, Manufacturing methods, Tests.

Problems associated with the accurate maintenance of the extremely close spacing required in the A-2582 tube have been solved satisfactorily. A step toward ruggedizing has been taken by allowing stiffening members to be formed on the grid-screen structure during the machining of this assembly. Preliminary tests indicate a much more rugged structure than required by the scope of this contract has been obtained. The conduction-cooling feature of the anode design is more than adequate. The design of the heater contact was changed to facilitate assembly. The major problems encountered in tube fabrication and processing were: (a) maintaining concentricity between active area of the grid and screen blanks, (b) bowed grid and screen wires, (c) obtaining satisfactory yields from brazing operations, (d) aligning the cathode assembly inside the

control grid, and (e) proper adjustment of the exhaust schedule. These problems were solved satisfactorily. All tubes passed their required design tests. Five heat sink type sockets were constructed and delivered. A 76 mc amplifier test set and a 76 mc amplifier life test were constructed and utilized in tube evaluation. (Author)

SCTM-355-61 (14) $4.60

Sandia Corp., Albuquerque, N. Mex.
SCATTERING ERROR IN A RADIO INTERFEROMETER, by Charles W. Harrison, Jr. 6 July 61, 45p.

PB 160 638 $3.60

Speer Carbon Co., Niagara Falls, N. Y.
DEVELOPMENT OF ELECTRODE MATERIALS FOR FUEL CELLS, by W. E. Parker and F. Rusinko, Jr. Quarterly rept. no. 1, 1 July-30 Sep 60, on Contract DA 36-039-sc-85356. [1960] 36p. 15 refs. Rept. no. SCC-5; AD-250 821.

DESCRIPTORS: *Fuel cells, *Electrodes, Materials, *Power supplies, Carbon, Graphite, Electrochemistry, Gas diffusion, Processing, Physical properties, Adsorption, Gases, Porosity, Determination, Density, Surface area.

A general search of the literature revealed that data on electrodes for use in fuel cells are meager. Most of the work reported in the literature has been concerned with the use of commercially available carbon and graphite. From the presently available data, it may be concluded that it is possible to produce electrode materials ranging in porosity from 24 to 48 percent, at least in the baked state. This material is now awaiting graphitization. Measurements of surface area, porosity, and pore size distribution are presently being conducted. (Author)

PB 160 639 $3.60

Speer Carbon Co., Niagara Falls, N. Y.
DEVELOPMENT OF ELECTRODE MATERIALS FOR FUEL CELLS, by W. E. Parker, F. Rusinko, Jr. and R. W. Marek. Quarterly rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85356. [1961] 38p. 3 refs. Rept. no. SCC-9; AD-254 459.

DESCRIPTORS: *Fuel cells, *Electrodes, Materials, *Power supplies, Electrochemistry, Physical properties, Measurement, Carbon, Graphite, Surface area, Gas diffusion, Processing, Gases, Porosity.

Mixes have been made with a variety of raw materials. Samples prepared from these have been baked at two different baking rates to 900 C. Baked samples have been heat-treated further to 2750 C. Physical property measurements have been conducted on the baked and graphitized samples. Carbons with surface areas of 100-200 sqm/g have been produced. These high area carbons are also found to contain a uniform pore size, concentrated at a pore diameter of approximately 2-4 microns. Inasmuch as no electrodes have undergone testing in a fuel cell thus far, no conclusions can be drawn concerning physical parameters of electrodes and fuel cell performance. (Author)
(See also PB 160 638)

AD-274 617 $8.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH. Consolidated quarterly status rept. 1 Oct-31 Dec 61, on Contracts Nonr-225(31), Nonr-225(24), AF 33(616)7944, AD-36-039-sc-85339, AF 49(638)660, DA 04-200-ORD-1087, AF 33(616)7726, DA 36-039-sc-87300, and DA 36-039-sc-85387. [1962] 97p. 40 refs. SEL-62-018.

DESCRIPTORS: *Solid state physics, *Electronics, *Scientific research, *Microwave oscillators, *Microwave amplifiers, *Masers, Ruby, *Lasers, Switching circuits, Differential equations, Integral equations, Electronic switches, *Semiconductors, Lattices, Ions, Silicon compounds, Germanium compounds, Gallium compounds, Arsenides, Diodes, *Infrared spectroscopy, Extremely high frequency, Parametric amplifiers, X-band, Cavity resonators, Solids, *Quantum mechanics, Electrons, Insulating materials, Digital systems, Data transmission systems.

TID-14977 $1.60

Temple U., Philadelphia.
PHOTOVOLTAIC EFFECTS OCCURRING WITH ANODIZED ZIRCONIUM AND NIOBIUM ELECTRODES. Technical progress rept. on Contract AT(30-1)-2775. Feb 62, 20p.

PB 160 602 $12.00

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
HIGH POWER COAXIAL CONNECTOR DEVELOPMENT, by Charles M. Chulick, Richard A. Egbert, and William E. Genung. Final engineering rept. 1 July 58-31 Mar 60, on Contract DA 36-039-sc-78143. 7 Apr 60, 163p. 6 refs. Rept. no. ETM-477; AD-240 081.

DESCRIPTORS: *Coaxial cables, *Plugs (Electricity), *Jacks (Electricity), Radiofrequency, Electrical cables, *Electric connectors.

The development of high power RF coaxial connectors for RG-220/U, RG-218/U, and RG-217/U cables is reported as an eight-phase program. The connector plug plugs and jacks are of two-piece construction with an interchangeability feature for the RG-218/U and RG-220/U cable accessories. Both high voltage and high power connector design approaches are discussed along with techniques in obtaining optimum impedance matching. Unique features of these connectors include moisture sealing in both mated and unmated conditions, and a threaded ferrule design which improves the high voltage performance by restricting any movement of the cable core relative to the connector body. Test procedures and results of the qualification tests are reported. (Author)

PB 160 592 $9.60

Westinghouse Research Labs., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT OF A CAMERA TUBE FOR NIGHT VIEWING, by J. Lempert and G. A. Klotzbaugh. Final rept. 1 May 59-30 Aug 60, on Contract DA 36-039-78920. 30 Sep 60, 116p. 20 refs.

Research rept. 415FD438-R5; AD-246 266.

DESCRIPTORS: Electron optics, *Camera tubes, *Phototubes, *Iconoscopes, Electron scanners, Electron beams, *Night photography, Signal-to-noise ratio, Design, *Television cameras.

A method of calculating the signal-to-noise ratio and resolution as a function of input illumination and camera tube design parameters was devised. Sample resolution calculations using aperture compensation corrections exhibit reasonable agreement with experimental data on image orthicon tubes, ebicon tubes with vidicon type scan, and vidicon tubes. Electron optical tests on factors effecting image focus and minification for the image section are described, as well as experimental work on substantially shortened image orthicon type dummy scan sections. A number of experimental ebicon tubes with return beam multipliers, which on test exceeded the sensitivity of standard image orthicon tubes, was fabricated. The construction and test of these tubes are discussed, as well as problems affecting dynode gain of the return beam multiplier. Thermal limitation of EBIC targets are reviewed, and test results summarized on different targets. (Author)

Mechanical Engineering

DC-59-5-41 $4.60

General Electric Co., Cincinnati, Ohio.
DESIGN PROPOSAL: A GAS DYNAMIC SYSTEM FOR CONTINUOUSLY HEATING 10/LB/SEC OF CLEAN AIR TO 3500°F UNDER PRESSURE, by S. E. Eckard. Preliminary rept. on Contract AT(11-1)-171. 13 Apr 59, 45p. 21 refs.

DC-60-3-77 $7.60

General Electric Co., Cincinnati, Ohio.
PRELIMINARY DESIGN: AN ELECTRICAL HEATER FOR HEATING AIR FROM 80°F TO 2750°F CONTINUOUSLY WITHOUT CONTAMINATION, by S. E. Eckard. Preliminary rept. on Contract AT(11-1)-171. 3 Mar 60, 70p. 9 refs.

TID-15245 $17.00

Hanford Atomic Products Operation, Richland, Wash.
MECHANICAL STANDARDS. Mar 62, 289p. HWS-10001-T.

Ordnance, Missiles, and Satellite Vehicles

NASA N62-12529 $1.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LIFT CONTROL DURING ATMOSPHERE ENTRY FROM SUPERCIRCULAR VELOCITY, by Rodney C Wingrove and Robert E. Coate. [1962] 18p. 18 refs.

NASA N62-12453 $4.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
RADIATIVE HEATING OF VEHICLES ENTERING THE EARTH'S ATMOSPHERE, by Bradford H. Wick. [1962] 43p. 21 refs.

PB 160 587 $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIMIT CYCLES FOR NON-SPINNING STATICALLY STABLE SYMMETRIC MISSILES, by Charles H. Murphy. Mar 59, 31p. 11 refs. Rept. no. 1071; AD-216 341.

DESCRIPTORS: *Guided missiles, Exterior ballistics, *Bodies of revolution, Rotating structures, Stability, Damping, Mathematical analysis.

It was theoretically shown that a non-spinning, statically stable, symmetric missile with aerodynamic moment coefficients which are nonlinear in the total angle of attack will not have stable steady state circular pitching and yawing motion. This type of motion, however, was observed for simple bodies of revolution. Thus a need for nonlinearities other than those depending on the total angle of attack exists. The introduction of nonlinearities depending on the angular velocities statisfies this need. The most general cubic moment with boty angles and angular velocities is considered in detail and corresponding amplitude planes constructed. Estimates of the coefficients of the new terms are made by means of an extension of the Allen-Kelley cross flow analogy. (Author)

PB 160 586 $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ON STABILITY CRITERIA OF THE KELLEY-McSHANE LINEARIZED THEORY OF YAWING MOTION, by C. H. Murphy. Apr 53, 45p. 27 refs. Rept. no. 853; AD-17 047.

DESCRIPTORS: *Ballistics, *Guided missiles, *Yaw, Theory, Stability, Gyroscopes, Mathematical analysis.

A more accurate dynamic stability criterion which contains the full perturbation term and the correct contribution of gravity is stated independently of the sign of the overturning moment coefficient (Km) and the presence or absence of non-zero spin. A generalization of the criterion is made by introducing a minimum permissible level of damping which is not necessarily zero. Static and gyroscopic stability are defined and discussed with respect to the dynamic stability criterion. The effect of spin and the location of center of mass on dynamic stability are discussed as well as the Kelley-McShane force system.

PB 160 649 $3.60

Flight Control Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
METHODS OF ANALYSIS FOR SPACE VEHICLE CONTROL SYSTEM REDUNDANCY, by Ronald O. Anderson. Dec 58, 32p. 7 refs. WADC Technical note 58-346; AD-206 670.

DESCRIPTORS: *Spaceships, *Control systems, Feedback, Analysis, *Gyroscopes, *Satellite vehicles, Reliability.

Several practical redundancy mechanizations for control system components on space vehicles are presented. In addition, reliability analysis methods for both manual and automatic redundancy mechanizations are presented along with their derivations. These derivations illustrate general techniques that may be used by the designer to analyze specific redundancy applications. Finally, the reliability of the redundancy mechanizations considered is compared and the advantage of active crewman participation in the form of in-flight repair is shown.

PB 160 624 $5.60

[Institute of Science and Tech.] U. of Michigan, Ann Arbor.
A MODEL FOR EVALUATING THE OUTPUT OF INTELLIGENCE SYSTEMS, by W. V. Caldwell, C. H. Coombs and others. Rept. on Proj. Michigan, Contract DA 36-039-sc-52654. Apr 59, 59p. 3 refs. Rept. no. 2144-272-T; AD-215 126.

DESCRIPTORS: *Military intelligence, *Combat, Military operations, Tests.

A large-scale experiment was designed to obtain the intuitive evaluations of intelligence reports from a large group of experienced Army officers. An interval scale of quality of the intelligence reports was constructed with a view to providing some mathematical models that describe simply the way in which the components of an intelligence report combine to determine the value of the report. The results of the study indicate (1) that officers judge such intelligence reports consistently, (2) that they use criteria in judging intelligence estimates different from those they use in judging courses of action, and (3) that the judgments depend to some extent on the combat experience of the officer. The different techniques of obtaining rating scales were found to produce essentially the same results.

PB 160 597-1 $7.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
FRICTIONAL RESISTANCE, HEATING AND WEAR AT HIGH SLIDING SPEEDS, by W. W. Shugarts, Jr. and H. G. Clarke, Jr. Rept. on Contract DA 36-034-ORD-1634 RD. 8 Mar 55, 71p. 75 refs. Interim rept. no. I-2448-1; AD-57 889.

DESCRIPTORS: *Bibliography, *Friction, Resistance, Heating, Oscillation, Instrumentation, *Copper, Steel, *Ordnance steel, Velocity, Deterioration.

Theoretical and experimental studies are made of the friction and the wear phenomena between rubbing solids at high speed with particular regard to the flow of heat away from the friction interface. The theoretical work includes a literature survey as well as considerable data on the thermal properties of copper and gun steel over the range from room temperature to the melting point of each metal. In preparation for a complete mathematical treatment, approximate heat transfer calculations are made for ideal cases which approach the conditions prevailing in the laboratory friction machine. The experimental work centers around the friction machine, where small samples of copper are applied to a steel disk rotating at speeds as high as 1500 fps. Improvements are made to existing techniques for measuring the temperature at the friction interface. Considerable study is given to a search for proof of the existence of a molten film at the friction interface. Friction tests of artillery shell steel produced evidence of a martensitic layer very similar to the "altered" layer well known in ballistics. An appendix includes a bibliography of literature concerning heat transfer and thermal properties of copper and gun steel. There are comments on the more pertinent references.

PB 160 597-2 $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
FRICTIONAL RESISTANCE, HEATING AND WEAR AT HIGH SLIDING SPEEDS, by W. W. Shugarts, Jr. Rept. on Contract DA 36-034-ORD-1634 RD. 15 June 55, 23p. 1 ref. Interim rept. no. I-2448-2; AD-65 813.

DESCRIPTORS: *Friction, Resistance, Oscillation, *Heat transfer, Metals, Steel, *Ordnance steel, Deterioration, Velocity.

An attempt to excite higher modes of vibration in the prodholding mechanism failed because of equipment limitations. Striking sharp blows to various parts of the mechanism, however, reveals frequencies that may have some bearing on those encountered in oscillatory-type friction tests. A highly oscillatory test at 30 lb load and 100 fps velocity is studied in detail. A logical correlation is found between the interrupted wear track and the fluctuations in both frictional force and temperature. At this low velocity, the inertial and elastic effects of the system override the friction effect effect. Additional friction tests of shell steel versus gun steel show the variations in heat penetration and wear with time and with heat input. The clue to heat penetration is the depth of the 'altered' layer (martensite). Measurements of the distribution of copper wear particles over a long distance confirm the previous results (i.e., some wear particles that leave the prod do not adhere to the disk). (Author) (See also PB 160 597-1)

PB 160 597-3 $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
FRICTIONAL RESISTANCE, HEATING AND WEAR AT HIGH SLIDING SPEEDS, by W. W. Shugarts, Jr. Rept. on Contract DA 36-034-ORD-1634 RD. 15 Jan 56, 50p. 14 refs. Interim rept. no. I-2448-3; AD-84 248.

DESCRIPTORS: *Friction, Steel, Martensite, *Copper, Electron microscopy, Heat transfer, Thermocouples, Thermoelectricity, *Ordnance steel, Resistance, Heating, Deterioration, Velocity.

Additional friction tests of shell steel versus gun steel show that variation in heat penetration and wear with heat input. The clue to heat penetration is the depth of the "altered" layer (martensite). An electron microscope study of wear surfaces produced many electron micrographs of worn friction surfaces of prods and wear tracks on the disk. The only area that appeared to have been melted was the overhanging lip at the trailing edge of the prod. An explanation has been evolved as to what might occur at the friction interface regarding the appearance and transfer of molten prod material. Recommendations are made for improving the experimental technique, which should make the interpretation of future micrographs less difficult. Several heat transfer theories of the temperature developed at the interface between two rubbing solids were examined. The correlation of these with the experimental data failed at speeds above, say, 200 fps. The progress of continuing tasks are reported, including a heat penetration study and the calibrations of materials used as friction thermocouples. (Author) (See also PB 160 597-2)

PB 160 598 $5.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
FUNDAMENTALS OF HIGH SPEED SLIDING FRICTION, by W. W. Shugarts, Jr. Final rept. on Contract DA 36-034-ORD-2478 RD. Feb 60, 54p. 16 refs. F-A2062; OOR Proj. no. 1822; AD-236 886.

DESCRIPTORS: *Friction, *Heat transfer, Alloys, Metals, Theory, Artillery, Projectiles, Gun barrels, Analysis, *Ordnance steel, Velocity.

An experimental study is made of the transfer of heat at a rubbing interface. Past work showed the usefulness of the martensitic layer formed on steel as an indicator of heat penetration. On that basis a search is made for other means of detecting the extent of heat penetration. The results are presented of tests of binary alloys, titanium and a special copper-steel combination material. Also, the effect of the addition of electrical heat to the friction process is shown experimentally. These experimental results are compared to existing theories treating the friction process, taking into account the melting of one of the rubbing solids. The agreement of the experiments with the theory was poor, indicating a need for more work. (Author)

PB 160 595 $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
NEW INSTRUMENTATION TO STUDY SLIDING FRICTION AT HIGH SPEEDS, by W. W. Shugarts, Jr. Interim rept. no. 3 on Research and Development to Improve Artillery Ammunition, on Contract DA 36-034-ORD-1215 RD. 30 Apr 54, 50p. 4 refs. Interim rept. I-2358-3; WAL 760/452-21; AD-36-867.

DESCRIPTORS: *Friction, *Test equipment, Rotating drum cameras, *Rotating bands, *Ordnance steel, Steel.

Improved instrumentation was developed for use with the high-speed friction tester in studies of the friction and the wear of rotating-band materials. The instrumentation includes 3 amplifiers, a pulse generator (timer), a 4-channel oscilloscope, a drum camera, and calibration equipment. Frictional and normal force signals from strain-gage bridges and thermocouple signals are amplified and, with a time signal, are fed into the 4-channel oscilloscope. In the oscilloscope, the signals are again amplified and presented simultaneously on the face of a 5-in.-diam CRT. The drum camera records these signals on 35-mm film at a film speed such that the test occupies less than 1 revolution of the drum. An identifying data card is recorded on the film prior to the test, and calibration signals for each channel except the timer are recorded before and after each test. The ranges and maximum probable errors of the test variable are (1) a frictional force of 5 to 50 $\pm$ 0.88 lb, (2) a normal force of 10 to 100 $\pm$ 3.7 lb, and (3) a temperature signal of 2 to 150 $\pm$ 0.65 mv. The over-all frequency response of the instrumentation is flat from dc to considerably better than 10 kc for even the lowest expected test speed.

PB 160 594 $22.25

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A SURVEY OF THE LITERATURE DEALING WITH SLIDING FRICTION [AND] APPENDIX A: SUMMARIES OF ARTICLES DEALING WITH THE PHENOMENA OF SLIDING FRICTION, ed. by Frederick Palmer. Rept. on Contract W36-034-ORD-7663. 1 July 47, declassified 26 July 49. 417p. 336 refs. Research rept. no. 331; ATI-173 233.

DESCRIPTORS: *Friction, *Bibliography, Deformation, Pressure, Welding, Adhesion, Abrasion, Velocity, Finishes, Temperature, Hardness, Lubricants, Gases, Electrostatics.

This report is based upon a survey of a large fraction of the literature, both domestic and foreign, which has to do with the phenomena connected with sliding friction. Special attention has been given to setting forth the opposing views of contemporary authorities on the following topics: (1) area of actual contact; (2) action of molecular forces; (3) theories of stick-slip; (4) factors producing wear; (5) dependence of friction upon speed of sliding; and (6) dependence of friction upon surface finish. (Author)

PB 160 596 $4.60

Laboratory for Research and Development, Franklin Inst., Philadelphia, Pa.
SLIDING FRICTION AT HIGH SPEEDS, by W. W. Shugarts, Jr. and H. G. Clarke, Jr. Interim rept. no. 8 on Research and Development to Improve Artillery Ammunition, Contract DA 36-034-ORD-1215 RD. 30 Apr 54, 41p. 5 refs. Interim rept. no. I-2358-8: WAL 760/452-26; AD-43 738.

DESCRIPTORS: *Friction, *Rotating bands, *Copper, Steel, Temperature, Thermocouples, Oscillation, *Ordnance steel, Tests.

Experimental results are presented on the effects of load, speed, and travel on the frictional resistance and wear of copper sliding on unlubricated steel. The data provide a broad rather than detailed picture of the effects of pressures from 4,000 to 24,000 psi, speeds from 150 to 1200 fps, and rubbing distances from 50 to 220 inches. An investigation was made of techniques for measuring the temperature at the interface between a sample (prod) and the moving surface of the disk. A prod-disk thermocouple was the most satisfactory of the several types tried. A few data were obtained on the frictional resistance and wear of various materials other than copper at one load-velocity condition (4,000 psi, 900 fps). At some test conditions the wear track and frictional resistance showed the occurrence of a type of 'stick-slip' at frequencies exceeding 20,000 cps. (Author)

NASA N62-12501 $4.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CONTROL OF DECELERATION AND RANGE FOR THE LUNAR MISSION, by E. Brian Pritchard. [1962] 42p. 28 refs.

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Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AMORPHOUS PHOSPHATE COATINGS FOR THERMAL CONTROL OF ECHO II, by Dewey L. Clemmons, Jr. and John D. Camp. [1962] 32p. 7 refs.

NASA N62-12500 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STRUCTURAL DYNAMICS ASPECTS OF THE MANNED LUNAR SPACE VEHICLE LAUNCH PHASE, by A. Gerald Rainey and Harry L. Runyan. [1962] 31p. 4 refs.

NASA N62-12502 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THERMAL PROTECTION FOR SPACECRAFT ENTERING AT ESCAPE VELOCITY, by William A. Brooks, Jr., Robert T Swann, and Kenneth L. Wadlin. [1962] 37p. 13 refs.

NASA N62-12467 $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A UNIQUE APPROACH TO AN X-BAND TELEMETRY RECEIVING SYSTEM, by E. A. Brummer and R. F. Harrington, [1962] 13p. 4 refs.

NASA N62-12906 $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF SEVERAL TYPICAL JUNCTIONS IN SPACE VEHICLE SHELL STRUCTURES, by Robert H. Johns, William C Morgan, and David A. Spera. [1962] 14p. 11 refs.

NASA N62-12472 $3.60

National Aeronautics and Space Administration, Washington, D. C.
THE UNITED STATES SPACE PROGRAM, by Addison M. Rothrock. 23 May 62, 39p.

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D 217.2:M66

Naval Ordnance Lab., White Oak, Md.
AMERICA'S USE OF SEA MINES, by Robert C. Duncan. Jan 62, 173p. 29 refs.

DESCRIPTORS: *Weapons, *Naval mines, *Underwater ordnance, *Naval mine warfare, *Undersea warfare, Minelaying, Minefields, Submarines.

Contents:
The battle of the kegs
Mines of today
Mine philosophy
1780 to 1860
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World development of mines to 1914
Mines for northern barrage, World War I
The northern barrage-planting and results
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How the mines were used
Looking backward and forward

PB 160 604 $1.60

Naval Ordnance Test Station, China Lake, Calif.
OPTIMUM PAY-LOAD-RATIO RELATION FOR MULTIPLE-STAGE ROCKETS, by G. Leitmann. 17 Apr 56, 16p. 3 refs. NAVORD rept. 5064; NOTS 1419.

DESCRIPTORS: *Rockets, Velocity, *Guided missiles, Surface to surface, *Sounding rockets.

The principle of the multiple-stage rocket is reviewed. It is shown that the burn-out velocity of a multiple-stage rocket is higher than that of a single-stage rocket of the same initial mass. It is also shown that the initial mass of a multiple-stage rocket required to take a given pay load to a specified velocity is minimum when the pay-load ratios of all stages are equal. (Author)

SCTM-41-62(73) $1.60

Sandia Corp., Albuquerque, N. Mex.
LEAD IMPACT PELLETS AND SAWTOOTH SHOCK PULSES, by R. L. Henderson. Mar 62, 20p.

PB 160 658-1 $22.50

Stanford Research Inst., Menlo Park, Calif.
SMALL EXPLOSION TESTS, by D. C. Sachs and L. M. Swift. Final rept. on Project Mole, Contract DA 04-167-eng-709. Dec 55, declassified 8 June 61, 405p. SRI Proj. no. PU-876; AFSWP-291, Vol. I; AD-223 157.

DESCRIPTORS: Tests, *Explosions, Analysis, *Earth, Stresses, Pressure, Acceleration, Blast, Measurement, Range tables, Instrumentation, Mathematical prediction, *Gages, Particles, Velocity, *Underground explosions, *Nuclear explosions, Atomic bomb explosions, Simulation.

As a step in the extrapolation of data from small explosions to predict the results of large ones, it was decided that a study should be made of the effects (particularly the underground effects) of a group of small charges detonated at various representative sites. This report contains the bulk of the description, analysis, and conclusions relative to the project and to prediction methods.

PB 160 658-2 $19.75

Stanford Research Inst., Menlo Park, Calif.
SMALL EXPLOSION TESTS, by D. C. Sachs and L. M. Swift. Final rept. on Project Mole, Contract DA 04-167-eng-709. Dec 55, 302p, declassified 8 June 61, 302p. 16 refs. SRI Proj. no. PU-876; AFSWP-291, Vol. II; AD-223 156.

DESCRIPTORS: Tests, *Explosions, Analysis, *Earth, Stresses, Pressure, Acceleration, Blast, Measurement, Range tables, Instrumentation, Mathematical prediction, *Gages, Particles, Velocity, *Underground explosions, *Nuclear explosions, Atomic bomb explosions, Simulation.

Contents:
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Sanitation and Safety Engineering

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TEST OF FRENCH UNDERGROUND PERSONNEL SHELTERS, by Edward Cohen and Norval Dobbs. Operation Plumbbob. 19 June 62, 294p.

PNE-127F $2.25

Holmes and Narver, Inc., Los Angeles, Calif.
PRE-SHOT AND POSTSHOT STRUCTURE SURVEY. Final rept. on Contract AT (29-2)-20. Project Gnome. Apr 62, 113p. 25 refs.

IDO-12021 $3.00

Idaho Operations Office, Atomic Energy Commission, Idaho Falls.
HEALTH AND SAFETY DIVISION ANNUAL REPORT, 1961. 21 May 62, 206p. 14 refs.

WT-1485 $0.50

Office of Civil and Defense Mobilization, Battle Creek, Mich.
AERIAL MONITORING OPERATIONS DEVELOPMENT, by Fred R. Rehm. Operation Plumbbob. 11 June 62, 28p.

PB 160 645 $9.10

Strategic Air Command, Offutt AFB, Nebr.
NUCLEAR WEAPONS ACCIDENT PROGRAM. 18 Oct 61, 106p. 59 refs. SAC Manual no. 355-1, supersedes annex IV, 23 May 60, to SACR 355-1 and change 1, 12 Sep 60, and change 2, 9 Mar 61.

DESCRIPTORS: *Nuclear weapons, *Accidents, *Safety, Strategic air command, *Instruction manuals, Radiation injuries, Countermeasures.

The purpose of this manual is to provide instructions and procedures to be used in organizing and training base level activities in the over-all base response to a nuclear accident, and to outline detailed response procedures used by base disaster control teams in coping with a nuclear accident.

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GRAPHS FOR ESTIMATING ATMOSPHERIC DISPERSION, by William F. Hilsmeier and Frank A. Gifford, Jr. July 62, 10p. 4 refs.

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General Electric Co., Cincinnati, Ohio.
DEVELOPMENT OF A HIGH STRENGTH BRAZING ALLOY FOR THE AFT RETAINER, by Paul R. Mobley. Rept. on Contract AT(11-1)-171. 31 Jan 61, 61p.

XDC-60-2-116 $3.60

General Electric Co., Cincinnati, Ohio.
GAMMA IRRADIATION OF TURBOJET ACCESSORY SYSTEMS, by D. E. Barnett and W. G. Baxter. Preliminary rept. on Contract AT(11-1)-171. 4 Feb 60, 29p.

DC-58-1-89 $4.60

General Electric Co., Cincinnati, Ohio.
REPORT ON AIR MOTOR, by F. W. Schnorr. Rept. on Contract AT(11-1)-171. 8 Jan 58, 45p.

PB 160 622 $4.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
FUSED SILICA ROCKET NOZZLES, by C. R. Mason, C. A. Murphy, and J. D. Walton. Quarterly rept. no. 7, 1 Sep-30 Nov 60, on Contract NOrd-18564. [1960] 45p. 2 refs. AD-250 490.

DESCRIPTORS: *Rocket motor nozzles, *Refractory materials, *Silicon compounds, Dioxides, Ceramic materials, *Flame spraying, Tungsten, Electric arcs, Resins, Graphite, Controlled atmospheres.

The acquisition of the charcoal-filtered hood greatly enhanced the flexibility of arc spraying in a controlled atmosphere and also provided for future spraying of toxic materials. The low velocity, high enthalpy nozzle and multiport powder injector should provide for more efficient particle melting, stronger shells, and higher density deposits. It is expected that this nozzle and powder injector, coupled with the modified nozzle insert shell mandrel, will enable the fabrication of insert shells from such powders as zirconia, hafnia, and hafnium carbide. The preliminary investigation of the low temperature method of sintering arc-sprayed tungsten indicated this method will be a means of greatly increasing the density of insert shells. (Author)

PB 160 654 $11.50

[Jet Propulsion Center] Purdue U., Lafayette, Ind.
TESTING AND DESIGN PROCEDURES EMPLOYED IN RESEARCH HIGH COMBUSTION PRESSURE ROCKET MOTORS, by C. M. Beighley and D. E. Robison. Rept. on Contract N7onr-39418. Apr 53, 155p. 30 refs. Rept. no. RM-53-2; AD-63 571.

DESCRIPTORS: *Rocket motors, Design, Test methods, *Rocket oxidizers, *Rocket fuels, *Rocket propellants, Instrumentation, Fuels, Starting, Nitric acid, Physical properties, Heat transfer, Combustion chambers, Pressure.

NASA N62-12474 $3.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
STUDY OF THERMONUCLEAR PROPULSION USING SUPERCONDUCTING MAGNETS, by Gerald W. Englert. [1962] 35p. 24 refs.

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Business and Defense Serivces Administration, Dept. of Commerce, Washington, D. C.
TRENDS IN THE WELDING EQUIPMENT INDUSTRY. Apr 62, 4p.

DESCRIPTORS: *Welding, *Industrial equipment, Shipping, Commerce, Industry, Machines.

TID-15247 $9.60

Hanford Atomic Products Operation, Richland, Wash.
WELDING STANDARDS. Mar 62, 120p. 5 refs. HWS-10004-T.

PWAC-165 $5.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
THE DEVELOPMENT OF ULTRASONIC WELDING AS A MEANS FOR JOINING HEAT EXCHANGER COMPONENTS, by J. E. Meinhardt. Technical final rept. on Fox Project. 19 Feb 57, 54p.

MATERIALS

PB 160 612 $9.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
RESISTANCE OF PLASTICS TO OUTDOOR EXPOSURE, by Cecilia McNally. May 60, 104p. 2 refs. Technical rept. 2102, Addendum no. 2.

DESCRIPTORS: *Plastics, Aging, Climatic factors, Tensile properties, Ordnance, Materials, Nylon, Carbon black, Polymers, Styrenes, Acrylonitriles, Vinyl chlorides, Cellulose, Methyl propionates, Lactams, Humidity, Temperature, Precipitation.

This report describes the results of exposing 11 plastic materials to outdoor aging for three years at Picatinny Arsenal. Specimens of each material were removed every 6 months from the original date of exposure and all tensile properties evaluated. (The 3 nylon materials were given their first tests after 3 months.) Each material is covered in a separate appendix. (Author)

DC-51-11-26 $3.60

General Electric Co., Cincinnati, Ohio.
HYDROGENOUS SHIELD MATERIALS. SURVEY OF RADIATION DAMAGE, by F. H. Welch and L. J. D'Antonio. Evaluation rept. on Contract AT(11-1)-171. 23 Nov 51, declassified 29 Nov 61. 32p. 43 refs.

PB 160 543 $1.60

[Texaco] Experiment, Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON, by Claude P. Talley. Quarterly summary rept. Mar-May 57, on Contract Nonr-1883(00). 1 June 57, 12p. 9 refs. EXP 223; TM-952; AD-135 080.

DESCRIPTORS: *Boron, *Combustion, *Jet engine fuels, Oxidation, Rods, High temperature research.

Preliminary combustion rates of boron rods at 1150° and 2040°C boron brightness temperatures have been obtained at one atmosphere total pressure in oxygen and oxygen-nitrogen mixtures. Cigarette-type burning was found to be self-propagating in pure oxygen and in oxygen-nitrogen mixtures containing as much as 60% nitrogen. Evaporation of B_2O_3 was believed to be rate limiting particularly at low temperatures, whereas the actual collision rate of oxygen with the solid surface may have been controlling at high temperatures. The evaporation rate of boron was calculated to be 4000 times smaller than the observed consumption rate by burning at a boron brightness temperature of 2040°C and therefore would not be rate-controlling. An explanation is offered for the difference in burning character of boron in the form of solid rods and powders. (Author)

PB 181 295 $0.50

Williams, Clyde and Co., Columbus, Ohio.
"QUARPEL" - MULTIPURPOSE PROTECTIVE FINISH FOR TEXTILES. AN EVALUATION OF COMMERCIAL APPLICATIONS, by Robert E. Greenlee and William A. Losoncy, Jr. Rept. on Contract CC 4569. [1962] 6p. 15 refs.

DESCRIPTORS: *Textiles, *Finishes, *Moisture-proofing, Fluorocarbons, Effectiveness.

Adhesives and Sealants

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Tennessee U. Engineering Experiment Station, Knoxville.
THE LABYRINTH SEAL: THEORY AND DESIGN, by Frederick Arnold and William K. Stair. A literature survey. Mar 62, 24p. 31 refs.

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BeO STANDARDS, by R. Cooperstein. Preliminary rept. on Contract AT(11-1)-171. 10 Aug 59, 18p.

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General Electric Co., Cincinnati, Ohio.
FABRICATION AND PROCESSING OF BERYLLIDES AT GE-ANPD by D. A. Mannas. Preliminary rept. on Contract AT(11-1)-171. 25 May 60, declassified 12 May 61. 10p. 2 refs.

DC-59-18 $8.10

General Electric Co., Cincinnati, Ohio.
FORMATION OF ALUMINA COATINGS BY VAPOR DEPOSITION, by G. R. VanHouten. Preliminary rept. on Contract AT (11-1)-171. 28 Aug 59, 83p. 45 refs.

DC-59-3-200 $1.10

General Electric Co., Cincinnati, Ohio.
PRELIMINARY NOTES ON THE POSSIBLE IMPORTANCE OF THE KINETICS OF THE WATER GAS REACTION IN THE VAPOR PLATING OF ALUMINA, by G. R. VanHouten. Preliminary rept. on Contract AT(11-1)-171. 23 Mar 59, 8p.

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BASIC RESEARCH IN CERAMICS AND NONCRYSTALLINE SYSTEMS, by W. D. Kingery, R. L. Coble and others. Annual rept. on Contracts AT(30-1)-1852 and AT(30-1)-2574. 30 Mar 62, 10p. 19 refs.

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Pennsylvania State U. Coll. of Mineral Industries, University Park.
FUNDAMENTAL STUDIES IN HIGH TEMPERATURE MATERIALS PHENOMENA. HIGH TEMPERATURE PRESSURE PHYSICAL PROPERTY MEASUREMENTS. ELECTRICAL RESISTIVITY MEASUREMENTS OF MATERIALS IN RELATION TO HIGH TEMPERATURE TRANSFORMATIONS, by M. E. Bell, G. W. Brindley and others. Progress rept. 1 June 60-1 Mar 62, on Contract AT(30-1)-2581. 6 Mar 62, 42p. 14 refs.

MATHEMATICS

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AN INTRODUCTION TO 704 FORTRAN, by G. S. Pawlicki. Rept. on Contract W-31-109-eng-38. Mar 62, 19p.

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Institute of Mathematical Sciences, New York U., N. Y.
A NOTE ON THE CONVERGENCE OF ALTERNATING DIRECTION METHODS, by Milton Lees. 20 June 61, 16p. 10 refs.

UCRL-10110 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
APPLICATION OF LINEAR PROGRAMMING TO THE NUMERICAL SOLUTION OF LINEAR DIFFERENTIAL EQUATIONS, by Jonathan D. Young. Rept. on Contract W-7405-eng-48. 1 Mar 62, 86p. 30 refs.

NASA N62-12553 $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A TABLE OF ${}_2F_1(a,b;c;z)$ FOR $a=0(1/2)8$, $b=0(1/2)8$, AND $c=0(1/2)8$ WITH COMMENTS ON THE FINITE FORMS OF ${}_2F_1(a,b;c;z)$ by K. David Steidley. [1962] 12p. 13 refs.

Computing Devices

BNL-725(T-259) $0.50

Brookhaven National Lab., Upton, N. Y.
A COMPUTER LEARNS TO SEE, by Paul V. C. Hough. Brookhaven lectures series no. 14, Feb 62. June 62, 13p. 14 refs.

TID-15391 $4.60

Digital Computer Lab., U. of Illinois, Urbana.
HIGH SPEED COMPUTER PROGRAM (PART I) CIRCUIT RESEARCH PROGRAM (PART II) DATA REDUCTION METHODS (PART III). ILLIAC USE AND OPERATION (PART IV). IBM 650 USE AND OPERATION (PART V) INSTRUCTIONAL USE OF COMPUTERS (PART VI) CONTROL DATA CORPORATION 1604 (PART VII) GENERAL LABORATORY INFORMATION (PART VIII). Technical progress rept. on Contract AT(11-1)-415. Jan 62, 47p.

GAMD-2885 $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
"CTTS": CHANNEL TRAP TAPE SELECT, by William A. Growdon. Rept. on Contract AT(04-3)-314. 23 Jan 62, 36p.

PB 160 601 $2.60

Towson Labs., Inc., Md.
DEVELOPMENT OF A SIMPLIFIED ANALOG TO DIGITAL CONVERTER, by C. W. Barbour. Final rept. phase A (Rept. no. 3) on Contract DA 36-034-ORD-3181 RD. 15 June 60, 25p.

DESCRIPTORS: *Analog-to-digital converters, Design, Feasibility studies.

A program is described to conduct a performance feasibility investigation and development of detailed methods and means for applying the Capcoder principle to a practical analog-to-digital and digital-to-analog converter. The task covered the preliminary development in breadboard form of switches and switch drivers, the amplifier, and the comparator. The work resulted in a complete operating breadboard of the converter employing only 23 transistors exclusive of those in the test programmer and operating at 4 microseconds per bit with a 10-bit word. The converter permitted examination of general system characteristics and capabilities, but was not required to offer ultimate accuracy, size, power requirements, or circuit refinement. The converter demonstrated fully the efficiency of the technique in that total power input exclusive of the programmer was 4.2 watts and would be less than 5 watts with its eventual programmer. Recommendations are made for additional developments. (Author)

MECHANICS

WAPD-TM-258 $1.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
STRESSES AND DEFLECTIONS IN THICK, CURVED PLATES, by D. S. Griffin and C. M. Friedrich. Rept. on Contract AT(11-1)-Gen-14. Aug 61, 40p. 2 refs.

TID-15660 $3.60

Cornell U., Ithaca, N.Y.
TEMPERATURE AND PRESSURE DEPENDENCE OF CREEP IN POTASSIUM, by Charles Robert Kohler. Master's thesis. Rept. on Contract AT(30-1)-2504. Sep 61, 40p. 10 refs.

PB 160 599 $3.60

David Taylor Model Basin, Washington, D. C.
ANALYSIS OF DISCONTINUITY STRESSES ADJACENT TO A CENTRAL CIRCULAR OPENING IN A HEMISPHERICAL SHELL, by G. D. Galletly. Revised ed. May 56, 33p. 14 refs. Rept. 870, rev.

DESCRIPTORS: *Hemispherical shells, Stresses, Numerical analysis, Cylindrical bodies, Hydrostatic pressure, Pressure, Membranes, Pressure tanks, Design.

The approximate methods of Geckeler and Esslinger and the more exact method of Love were compared for determining the edge displacements and rotations around a small circular opening in the crown of a thin uniform hemispherical shell. In a particular case (radius/thickness = 90.5, total angle of opening = 21 degrees) the Geckeler results departed from the Love results by a maximum of +15 percent, the Esslinger results by -3 percent. This indicates that the Esslinger method should be satisfactory for most practical cases. Application is made to the stress distribution caused by hydrostatic pressure at the intersection of a cylinder with a hemisphere. (Author)

NASA N62-12439 $1.10

Florida U. Engineering and Industrial Experiment Station, Gainesville.
GENERAL INSTABILITY OF CYLINDRICAL SHELLS, by S. Y. Lu and William A. Nash. Semiannual status rept. 15 May-15 Nov 61, on NASA Grant NsG-16-59. [1961] 6p. 5 refs.

DC-58-3-147 $1.60

General Electric Co., Cincinnati, Ohio.
DISPLACEMENTS AND STRESSES IN A CIRCULAR CYLINDER PRODUCED BY A PAIR OF EQUAL AND OPPOSITE LINE LOADS, AXIALLY DIRECTED. STRUCTURAL MEMO. NO. 17, by R. J. Dunholter. Rept. on Contract AT(11-1)-171. 18 Mar 58, 20p. 3 refs.

DC-60-1-146 $1.60

General Electric Co., Cincinnati, Ohio.
FRICTION AND WEAR OF METALLIDED SURFACES, by C. F. Zapf. Preliminary rept. on Contract AT(11-1)-171. 19 Jan 60, 18p.

DC-58-2-166 $2.60

General Electric Co., Cincinnati, Ohio.
PROGRAMMING INFORMATION FOR AN IBM SOLUTION TO THE GENERAL COLUMN BUCKLING PROBLEM-STRUCTURAL MEMO NO. 16, by S. W. Tagart. Rept. on Contract AT(11-1)-171. 21 Feb 58, 30p.

PB 160 619 $5.60

Illinois U., Urbana.
THE RESPONSE OF SIMPLE STRUCTURES TO DYNAMIC LOADS, by Nancy Brazell Brooks and N. M. Newmark. Technical rept. on Numerical and Approximate Methods for Stress Analysis, Contract N6ori-071(06). Apr 52, 57p. 5 refs. Civil Engineering Studies Structural Research Series no. 51; AD-11 753.

DESCRIPTORS: *Structures, *Blast, Stresses, Mathematical analysis, Materials, Physical properties, Elasticity, Plasticity, Load distribution, Civil engineering, Dynamics.

The response of a simple structure to dynamic disturbances was studied, and the effect on that response of variations in the parameters of load and in the characteristics of the structure was determined. The impulsive load patterns include those blast and impact disturbances described by a step-or triangular-pulse function. The structure under study can be represented by an undamped, single-degree-of-freedom system with elasto-plastic resistance to motion. The results of the analysis are presented in dimensionless form. An analytical procedure is employed for determining the response of the system, its maximum response, and the influence of the problem parameters on that maximum response. The analytic expressions for the influence factors are included for each type of influence pattern studied. These influence factors are charted for the step-pulse function and the initial triangular forcing function. The graphs for the influence factors illustrate the order of importance of the changes in the various parameters. The average applied load is the most critical in its effect on the maximum response in the impulse region, and has the greatest influence on the maximum response in the long-duration region.

NASA N62-12477 $4.60

New York U. Coll. of Engineering, N. Y.
COMPRESSIVE STABILITY OF ORTHOTROPIC CYLINDERS, by George Gerard. Rept. on Research Grant NsG-17-59. 15 May 62, 46p. 7 refs. Technical rept. SM-62-4.

K-1525 $0.75

Oak Ridge Gaseous Diffusion Plant, Tenn.
USE OF A VARIATIONAL PRINCIPLE IN THE NUMERICAL DETERMINATION OF THE BUCKLING EIGENVALUES OF A THIN RECTANGULAR PLATE, by Robert G. Edwards. Rept. on Contract W-7405-eng-26. 6 July 62, 28p. 6 refs.

SCR-487 $1.60

Sandia Corp., Albuquerque, N. Mex.
MEASUREMENT OF INTERNAL STRAINS IN A BAR SUBJECTED TO LONGITUDINAL IMPACT, by W. E. Baker and R. C. Dove. Mar 62, 17p. 6 refs.

SCTM-371-61(71) $1.60

Sandia Corp., Albuquerque, N. Mex.
THERMAL STRESSES IN AXISYMMETRIC THIN WALLED SHELLS OF CYLINDRICAL AND CONICAL SHAPE, by R. D. Hoagland. Jan 62, 11p. 3 refs.

PB 160 637 $8.10

Stanford U., Calif.
ON THE VIBRATIONS OF TRIANGULAR MEMBRANES, by Grove C. Nooney. Technical rept. no. 35 on Contract N6ori-106, T.O. 5. 22 Oct 53, 85p. 12 refs. AD-19 098.

DESCRIPTORS: *Membranes, *Vibration, Mathematical analysis, Functions, Integral equations.

The first part discusses the exceptional triangles and is divided into five chapters: the first contains preliminary considerations, the following three discuss the three exceptional triangles, and the fifth presents two applications of the preceding. The second part discusses the approximation of the eigenvalues of more general triangles and contains methods for estimating the least positive eigenvalue of each membrane problem for isoceles triangles and right triangles. Simultaneous upper bounds are found for the first three eigenvalues of the first membrane problem for the general triangle.

Aerodynamics and Pneumatics

PB 160 588-S-1 f $9.10

Aeronautical Research Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
TABLES OF LIFT AND MOMENT COEFFICIENTS FOR AN OSCILLATING WING-AILERON COMBINATION IN TWO-DIMENSIONAL SUBSONIC FLOW, by Henry E. Fettis. Rept. on Contract AF 33(038)22256. Oct 54, 101p. 12 refs. AF Technical rept. 6688, Suppl. 1.

DESCRIPTORS: Wings, *Airfoils, Lift, Moments, *Aerodynamics, Oscillation, Subsonic flow, *Tables

The tables in Appendix 1 of the present supplement to AFTR 6688 constitute an extension to those presented in Appendix 1 of the original report. (PB 160 588). The Mach number and the range of the reduced frequency remain the same, while the range of the control surface leading edge position has been extended so as to allow for variation of the control surface chord from 5% to 60% of the total airfoil chord. All of these coefficients were computed with the use of the linear approximation to the Possio Integral Equation as described in WADC TR 52-56. Appendix 2 contains the results of computations which employed a cubic approximation to the Possio Equation, while Appendix 3 gives values of similar coefficients which were computed by other methods. (Author)

PB 160 588 $3.60

[Aeronautical] Research Lab., Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
TABLES OF LIFT AND MOMENTS COEFFICIENTS FOR AN OSCILLATING WING-AILERON COMBINATION IN TWO-DIMENSIONAL SUBSONIC FLOW, by Henry E. Fettis. Rept. on Contract AF 33(038)22256. Nov 51, 36p. 9 refs. AF Technical rept. no. 6688; ATI-159 574.

DESCRIPTORS: Wings, *Airfoils, Lift, Moments, *Aerodynamics, Oscillation, Subsonic flow, *Tables.

The present report contains some preliminary results on the computation of lift and moment coefficients for an oscillating, flapped airfoil in compressible subsonic flow, by the method described in OAR Technical Report No. 5. The aerodynamic coefficients are evaluated for the same degrees of freedom, Mach number and control surface chord ratio as in the above reference, but are tabulated for a larger number of values of the reduced frequency. Included also are complete tables of the functions j_0, j_1, j_2, needed in the computations, as well as partially complete tables of some of the other special functions involved. (Author)

NASA N62-12353, $1.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
MEASUREMENTS IN A FROZEN, PARTIALLY DISSOCIATED, HIGH-SPEED GAS STREAM, by Ernest L. Winkler and Roy N. Griffin, Jr. [1962] 12p.

NASA N62-12460 $1.10

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
NOTE ON THE THREE-POINT BOUNDARY-VALUE PROBLEM FOR THE BLASIUS EQUATION, by E. Dale Martin [1962] 8p. 10 refs.

PB 160 600 $9.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE TRANSITION FROM A TURBULENT TO A LAMINAR BOUNDARY LAYER, by Joseph Sternberg. May 54, 103p. 26 refs. Rept. no. 906.

DESCRIPTORS: Cylindrical bodies, Conical bodies, Supersonics, *Turbulent boundary layer, *Laminar boundary layer, Boundary layer, Turbulence, Temperature.

The boundary layer on a 58° included angle cone-cylinder model has been studied over a range of supersonic speeds. Boundary layer recovery factors have been measured and shadowgraphs have been taken of the model in the wind tunnel and free flight. These measurements indicate that when the boundary layer ahead of the shoulder is turbulent, the boundary layer is laminar after the shoulder for a short distance. A theoretical model of the phenomenon has been constructed and calculations have been made using available boundary layer theory and experimental data to describe the course of the boundary layer from just ahead of the shoulder to the transition back to turbulent flow on the cylinder. Reasonably good agreement is found between the experiments and the calculations.

DC-57-10-98 $2.60

General Electric Co., Cincinnati, Ohio.
THE DESIGN OF A PNEUMATIC PRESSURE REGULATING AND QUICK EXHAUST VALVE, by F. W. Schnorr, Jr. Preliminary rept. on Contract AT(11-1)-171. 15 Oct 57, 24p.

NASA N62-12469 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RECENT INVESTIGATIONS OF THE AERODYNAMIC CHARACTERISTICS OF GENERAL AND SPECIFIC LIFTING AND NONLIFTING CONFIGURATIONS AT MACH 24 IN HELIUM, INCLUDING AIR-HELIUM SIMULATION STUDIES, by Arthur Henderson, Jr. [1962] 38p. 26 refs.

TIM-615 $3.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
MODIFICATION OF DOUBLE VANE PNEUMATIC ROTARY ACTUATOR FOR BENDIX TURBOPUMP TO SINGLE VANE, by P. V. Naples. 27 July 59, 31p.

TIM-612 $4.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
A PNEUMATIC LINEAR ACTUATOR FOR A TURBOPUMP CONTROL VALVE, by P. V. Naples. 8 July 59, 39p.

SCTM 335-61 (71) $1.60

Sandia Corp., Albuquerque, N. Mex.
THE COMPRESSIBLE LAMINAR BOUNDARY LAYER WITH ARBITRARY HEAT TRANSFER AND PRESSURE GRADIENT, by P. E. Lambdin. Nov 61, 17p. 3 refs.

SCTM 352-61 (73) $2.60

Sandia Corp., Albuquerque, N. Mex.
A METHOD FOR EVALUATING THE DESIGN OF PNEUMATIC ACTUATORS USED FOR SHOCK TESTING, by Lewis H. Mason. Jan 62, 28p.

Hydrodynamics, Hydraulics, and Hydrostatics

PB 160 634 $7.60

[Davidson Lab.] Stevens Inst. of Tech., Hoboken, N. J.
LIFT AND DRAG OF HYDROFOILS: APPLICATION OF THEORY TO EXPERIMENTAL RESULTS, by B. B. Korvin-Kroukovsky and Robert J. Wernick. Rept. on Contract Nonr-263 (01). May 52, declassified 12 Dec 57, 79p. 18 refs. Rept. no. 438; AD-8348.

DESCRIPTORS: *Hydrofoils, Lift, Drag, *Hydrodynamics, Experimental data, Theory.

A hydrofoil moving at a given angle of attack near the surface of a fluid experiences a resistance which can be broken down into the following components: a wave-making drag caused by bound vortices in proximity to the surface, an induced drag caused by trailing vortices resulting from a finite span, and a profile drag consisting of the frictional and eddy-making drag of the hydrofoil. It is found in the present report that the induced drag of a hydrofoil of aspect ratio ≥ 6 (the smallest investigated) can be computed with sufficient accuracy by a procedure similar to that used for airfoils in an infinite medium.

PB 160 516 $10.50

Institute of Engineering Research, U. of California, Berkeley.
WATER WAVES. III, by John V. Wehausen. Rept. on Contract Nonr-222(30). May 59, 135p. Series no. 82, Issue no. 8; AD-227 276.

DESCRIPTORS: *Water waves, Mathematical analysis, Theory, Boundary layer, Velocity.

Contents:
Initial-value problems
Waves in basins of bounded extent
Gravity waves in the presence of surface tension
Waves in a viscous fluid
Stability of free surfaces and interfaces
Higher-order theory of infinitesimal waves

METALLURGY

PB 160 616 $3.60

Alloyd Corp., Cambridge, Mass.
RESEARCH ON THE PRODUCTION OF ULTRA PURE REFRACTORY METALS. Final technical summary rept. 1 July 59-30 June 60, on Contract NOas-59-6248-c. 27 Sep 60, 36p. 5 refs. AD-246 772.

DESCRIPTORS: *Refractory materials, Metals, *Tungsten, *Tantalum, *Molybdenum, Purification, Impurities, Reduction, Chlorides, Production, Tantalum compounds, Tungsten compounds, Molybdenum compounds.

Molybdenum, tantalum and tungsten metals were prepared by hydrogen reduction of purified chloride vapours. The chlorides were purified by combinations of low-pressure distillation and multi-pass zone refining. Experimental conditions have been explored, as a result of which it has been found that with chloride vaporization temperatures of 150 to 250 C, reduction temperatures of 800 to 950 C, total pressure during reduction of 15 cm Hg or less, and H_2: chloride mole ratios of 5 to 20:1 satisfactory deposits of coherent, fully dense metal are obtained. Molybdenum samples up to 60 g in weight, deposited at up to 8.9g/hr were produced. Similar data for tungsten are 177 g in weight, with a maximum deposition rate of 18.7 g/hr. Comparable data for tantalum are not available. The impurity contents of the metals were

quite low, ranging from (approximately) 10 to 100 ppm for molybdenym, 30 to 2500 ppm for tungsten, and 30 to 200 ppm for tantalum (metallic impurities). Gaseous impurities (oxygen, hydrogen, nitrogen) generally totaled less than 10 ppm. (Author)

ACCO-12 $6.60

American Cyanamid Co., Winchester, Mass.
ELUTION OF URANIUM FROM ANION EXCHANGE RESINS BY PREGNANT RAND SOLUTIONS, by J. H. Pannell, S. B. Michal and others. Rept. on Contract AT(49-1)-533. 30 Apr 53, declassified 3 July 62. 56p.

ACCO-44 $3.60

American Cyanamid Co., Winchester, Mass.
INVESTIGATIONS OF ION EXCHANGE METHODS FOR RECOVERY OF URANIUM FROM LIQUORS PRODUCED BY ACID LEACHING OF GUNNAR ORE, by N. N. Schiff and G. W. Lower. Rept. on Contract AT(49-1)-533. 21 June 54, declassified 3 July 62. 44p.

ACCO-2 $1.60

American Cyanamid Co. [Winchester] Mass.
POSSIBLE SUBSTITUTES FOR GLUE IN SOUTH AFRICAN ORE TREATMENT, by R. J. Woody. Rept. on Contract AT(49-1)-533. 24 May 51, declassified 3 July 62. 15p.

ACCO-9 $1.60

American Cyanamid Co., [Winchester] Mass.
PRELIMINARY REPORT ON RECOVERY OF URANIUM FROM HIGH CARBONATE BELGIAN CONGO URANIUM ORES, by D. R. George, R. H. Kennedy and others. Rept. on Contract AT(49-1)-533. 30 Oct 51, declassified 3 July 62. 21p.

ACCO-7 $3.60

American Cyanamid Co. [Winchester] Mass.
PRELIMINARY REPORT ON RECOVERY OF URANIUM FROM LOW GRADE BELGIAN CONGO ORES, by J. J. Brunner, D. R. George, and E. M. Rubino. Rept. on Contract AT(49-1)-533. 5 Oct 51, declassified 3 July 62. 34p.

ACCO-26 $6.60

American Cyanamid Co., Winchester, Mass.
PRELIMINARY STUDIES OF THE ADSORPTION OF URANIUM IN A RESIN IN PULP SYSTEM, by Charles S. Abrams and David Kaufman. Rept. on Contract AT(49-1)-533. 27 July 53, declassified 3 July 62. 69p.

ACCO-3 $4.60

American Cyanamid Co. [Winchester] Mass.
PROGRESS REPORT FOR 16 MARCH-15 MAY 51, on Contract AT(49-1)-533. 4 June 51, declassified 3 July 62. 45p.

ACCO-34 $2.60

American Cyanamid Co., Winchester, Mass.
REMOVAL OF CHLORIDE FROM CONGO PRECIPITATES, by Hans I. Viklund and Richard H. Kennedy. Rept. on Contract AT(49-1)-533. 3 Nov 53, declassified 3 July 62. 30p.

ANL-6268 $1.00

Argonne National Lab., Ill.
DEVELOPMENT OF LIQUID PHASE SINTERING TECHNIQUES FOR MOLYBDENUM ALLOYS. Final rept. on Contract W-31-109-38-1062. Dec 60, 46p. 4 refs.

Order from GPO $0.10 as
I 28.37/a:M564/961

Bureau of Mines, Washington, D. C.
REVIEW OF METALLURGICAL TECHNOLOGY, by Rollien R. Wells and Earl T. Hayes. 1962, 10p. 1 ref.

Preprint from Bureau of Mines Minerals Yearbook, 1961.

DESCRIPTORS: *Metallurgy, Technological intelligence.

PB 160 641 $3.60

Case Inst. of Tech., Cleveland, Ohio.
AN INVESTIGATION ON IMPROVING THE PROPERTIES OF ENGINEERING METALS BY THE APPLICATION OF ULTRASONIC VIBRATIONS, by Allan H. Freedman and J. F. Wallace. Final technical rept. 15 June 56-14 June 57, on Contract DAI 33-019-505-ORD-(P)-4. Aug 57, 37p. 5 refs. WAL 143/41-1; AD-207 308.

DESCRIPTORS: *Ultrasonics, *Vibration, *Metals, Casting, Sintering, Hydrogen, Diffusion, Metal powders.

Sixty cycle vibrations were applied to investment molds during the pouring of an aluminum-4.5% copper casting. A substantial increase in filling and casting detail was produced by the vibrational energy. Low intensity, twenty kilocycle vibrations were applied to the compacting and sintering of powdered iron. A slight increase in density and hardness of the green compacts was produced by vibration treatment during pressing. Experimental limitations in the sintering experiments resulted in considerable scatter in the data and no conclusions could be drawn. Ultrasonic energy (20 Kc) was employed in an attempt to increase the diffusion rate of hydrogen in steel at room temperature as measured in terms of notch tensile

strength and ductility. The vibrational energy produced no appreciable increase in the rate of hydrogen removal in cadmium plated and unplated hydrogen-charged specimens. Sixty cycle vibrations were applied to solidifying specimens of high speed tool steel cast in investment and water-cooled copper molds. The investment castings exhibited some grain refinement and reduction in segregation as a result of the vibration treatment. The influence of vibrational energy on the chill cast bars was less because of the smaller grain size and reduced segregation in these rapidly solidified bars. (Author)

TID-15145 $5.60

Illinois U., Urbana.
METAL-GAS EQUILIBRIUM AND THE NIOBIUM-NITROGEN TERMINAL SOLID SOLUTION, by James Cost and Charles A. Wert. Rept. on Contract AT(11-1)-1046. Dec 61, 52p.

IS-351 $2.50

Iowa State U. of Science and Tech., Ames.
METALLURGY. Annual summary research rept. July 60-June 61, on Contract W-7405-eng-82. Dec 61, 143p. 144 refs.

TID-14631 $1.60

Minnesota U., Minneapolis.
ANOMALOUS RESISTIVITY CHANGES ACCOMPANYING PLASTIC DEFORMATION IN Cu-Pd AND Ag-Pd ALLOYS. Rept. on Contract AT(11-1)-1009. 1961, 12p.

PB 160 576 $1.10

Pittsburgh U., Pa.
RARE EARTH CHALCOGENIDES, by J. Alfred Berger. Rept. for 1 June-1 Sep 59, on Contract NObs-77068. 15 Sep 59, 4p. AD-246 266.

DESCRIPTORS: *Thermoelectricity, *Rare earths, Rare earth compounds, Cerium compounds, Oxides, *Electric power production.

Studies were continued on the development of thermoelectric power generating materials from the rare earth compounds of one or more of the lanthanide series of elements with Group IV B elements. Tests were made of the cold pressing, sintering, and fusion characteristics of the rare earth compacts. The commercial rare earth oxide and the high purity ceric oxide achieved densities of about 77 and 97% of the ideal density of chemically pure ceric oxide, respectively. X-ray diffraction and fluorescent analyses were made on all raw materials as well as on all samples before and after sintering or fusion. For all samples, doped and undoped, there was no change in either structure or composition after sintering.

PB 160 577 $1.10

Pittsburgh U., Pa.
RARE EARTH CHALCOGENIDES, by August R. Freda. Rept. for 1 Sep-15 Nov 59, on Contract NObs-77068. 30 Nov 59, 2p. AD-231 572.

DESCRIPTORS: *Thermoelectricity, *Rare earths, Cerium compounds, Oxides, Materials.

Resistivity measurements were made on the commercially pure rare earth oxides and the high-purity ceric oxide produced from an iron exchange process before and after sintering. The measurements were also made on the doped and undoped compacts. All undoped green compacts of both the commercial rare earth oxide and high-purity ceric oxide revealed the same resistivity of approximately 10^6 ohm-cm. Extreme care was taken with a new set of compacts which were slowly cooled from the sintering temperature of 1350°C to room temperature over a period of approximately 16 hours. These compacts also exhibited extremely high resistivities which approached infinity. (See also PB 160 576)

TID-14773 $2.60

Purdue U. School of Metallurgical Engineering, Lafayette, Ind.
DIFFUSION IN LIQUID ALLOYS, by Richard E. Grace. Technical progress rept. 31 Jan-31 Dec 61, on Contract AT(11-1)-359. 10 Jan 62, 22p. 8 refs.

TID-15643 $10.50

Purdue U., Lafayette, Ind.
AN INTERNAL FRICTION STUDY OF VERY LOW CARBON MARTENSITE, by Jared K. Jackson. Doctoral thesis. June 61, 134p. 98 refs.

TID-15663 $3.60

Syracuse U., N. Y.
INVESTIGATION OF SPECIFIC VOLUMES OF LIQUID METALS AND ALLOYS, by Frank A. Kanda and Douglas V. Keller. Rept. no. 1 on Contract AT(30-1)-2731. May 62, 35p.

TID-15621 $1.60

Temple U., Philadelphia, Pa.
A STUDY OF THE IB-IIB BETA PHASE ALLOYS, by Leonard Muldawer. Annual progress rept. 1 June 61-31 July 62. 18p.

BMI-X-198 $1.60

Battelle Memorial Inst., Columbus, Ohio.
CORROSION INVESTIGATION OF EXPERIMENTAL ALLOYS UNDER HYDROFLUORINATOR CONDITIONS, by P. D. Miller, E. F. Stephan, and F. W. Fink. 20 Apr 62, 11p.

DC-57-3-19 $2.60

General Electric Co., Cincinnati, Ohio.
STRUCTURAL PROPERTIES OF MOLYBDENUM ALLOYS AT ELEVATED TEMPERATURES (STRUCTIONAL MEMO #8), by A. L. Ross and B. R. Thompson. Preliminary rept. on Contract AT(11-1)-171. 28 Feb 57, 30p.

PB 160 609 $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
GRAIN REFINEMENT IN BERYLLIUM BY ALLOYING, by D. Crooks and H. Sumsion. Technical note 1 July 58-31 Dec 59, on Contract NOrd-17017. Jan 60, 44p. 30 refs. LMSD-288233; AD-239 350.

DESCRIPTORS: *Beryllium, *Beryllium alloys, Grains (Metallurgy), Microstructure, Tensile properties, Hardness, Airframes.

Literature is reviewed relevant to the lack of ductility in beryllium and the effect of purity on ductility, with particular reference to the effect of alloying upon grain refinement of the cast metal. Experimental procedure is described for producing alloy buttons in a vacuum-inert atmosphere arc furnace with nonconsumable electrodes and water-cooled copper hearth. A method of making a preliminary evaluation of alloy buttons is described, and results of the evaluations are given. (Author)(Also included in PB 150 613-2)

TIM-435 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
HASTELLOY X FORCED CONVECTION NaK CORROSION LOOP TESTS, HXLM-1 AND 2, by R. C. Shaw. Rept. on Contract AT(11-1)-229. 19 Sep 58, declassified 13 Apr 60. 13p.

TIM-490 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
TYPE-316 STAINLESS STEEL FORCED CONVECTION SODIUM CORROSION LOOP TESTS SSSA-1A1, SSSA-2C2, SSSA-3C3, AND SSSA-5F1, by R. C. Shaw. Rept. on Contract AT(1101)-229. 2 July 58, declassified 13 Apr 60. 20p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-5231 $15.90

Atomic Energy Commission. [Div. of] Technical Information [Extension] Oak Ridge, Tenn.
URANIUM TECHNOLOGY. GENERAL SURVEY, by J. E. Vance and J. C. Warner. Declassified 29 Sep 60. 1961, 238p. 10 refs. National Nuclear Energy Series NNES-VII-2A.

BMI-1580 $0.50

Battelle Memorial Inst., Columbus, Ohio.
THE CHEMICAL REACTIONS OF PuO_2 WITH REACTOR MATERIALS, by Stan J. Paprocki, Donald L. Keller, and William M. Pardue. Rept. on Contract W-7405-eng-92. 29 May 62, 14p. 6 refs.

WAPD-TM-320 $1.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
MO176: A FORTRAN PROGRAM TO SOLVE SEVERAL P-APPROXIMATIONS TO THE FEW GROUP NEUTRON TRANSPORT EQUATION IN SLAB GEOMETRY, by R. M. Cantwell. Rept. on Contract AT(11-1)-GEN-14. Apr 62, 46p. 3 refs.

WAPD-TM-273 $1.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
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INSULATIONS DESIGN FOR GASCOOLED REACTORS, by T. D. McLay. Preliminary rept. on Contract AT(11-1)-171. 4 Apr 57, declassified 3 Aug 61, 29p.

DC-58-1-191 $2.60

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF THERMAL EXPANSION PROBLEMS IN P-102 MODERATOR, by R. G. Cook and L. E. Eckart. 14 Jan 58, declassified 25 July 61, 26p.

XDC-60-3-211 $7.60

General Electric Co., Cincinnati, Ohio.
ISOTOPIC HISTORY TRACE, PROGRAM 431, by S. K. Breslauer and F. P. Karriker. Preliminary rept. on Contract AT(11-1)-171. 10 Mar 60, 79p.

DC-52-4-37 $1.60

General Electric Co., Cincinnati, Ohio.
A METAL SCREEN, FOLDED, WATER MODERATED AIR CYCLE REACTOR, by W. B. Thomson. 17 Apr 52, declassified 3 Apr 62. 11p. 7 refs.

DC-58-2-206 $5.60

General Electric Co., Cincinnati, Ohio.
MILESTONE II FOR TASK 7474, by J. A. McGurty. Preliminary rept. on Contract AT(11-1)-171. 27 Feb 58, declassified 1 Feb 62. 52p.

DC-58-3-128 $5.60

General Electric Co., Cincinnati, Ohio.
NUCLEAR DATA COMPILATION D102A REACTOR, by R. Dries 5 Feb 58, declassified 1 June 61, 55p.

DC-59-12-216 $4.60

General Electric Co., Cincinnati, Ohio.
P-103•PRESSURE VESSEL STRAIN CONCENTRATIONS, by W. E. Nickola. Preliminary rept. on Contract AT(11-1)-171. 30 Dec 59, 43p.

DC-52-28-55 $3.60

General Electric Co., Cincinnati, Ohio.
RADIATION DAMAGE TO REACTOR CONTROL SYSTEM COMPONENTS, by John L. Anderson. 13 Aug 52, declassified 18 July 61. 40p. 29 refs.

DC-58-8-192 $4.60

General Electric Co., Cincinnati, Ohio.
SINGLE ENGINE SHIELD MECHANICAL DESIGN STUDY, by F. J. Frank. Rept. on Contract AT(11-1)-171. 22 Jul 58, declassified 26 July 61. 46p.

DC-60-1-108 $2.60

General Electric Co., Cincinnati, Ohio.
STRESS OXIDATION OF 80 Ni-20Cr FUEL ELEMENTS, by A. J. Butterfield. Preliminary rept. on Contract AT(11-1)-171. 15 Jan 60, declassified 16 May 61. 29p. 16 refs.

APEX-155 $10.10

General Electric Co., Cincinnati, Ohio.
SUMMARY HAZARDS REPORT FOR CRITICAL EXPERIMENTS WITH TRA-2 REACTOR, ed. by G. P. Kerr. 2 Apr 54, declassified. 129p.

DC-60-2-209 $1.60

General Electric Co., Cincinnati, Ohio.
SWIRL FLOW PRESSURE LOSSES IN CONCENTRIC RING FUEL ELEMENTS, by L. Manning. Preliminary rept. on Contract AT(11-1)-171. 23 Feb 60, declassified 29 Nov 61. 18p.

DC-58-9-35 $3.60

General Electric Co., Cincinnati, Ohio
TEST OF P-102 PRIMARY SHIELD BOLTS, by R. Roberts. Rept. no. 419 on Contract AT(11-1)-171. 3 Sep 58, 40p.

DC-57-5-78 $1.60

General Electric Co., Cincinnati, Ohio.
TSM MEASUREMENTS REPORT NO. 2, by H. L. Bermanis and B. W. Link. 8 May 57, declassified 16 May 61, 15p.

TID-15373 $0.75

Gladding, McBean and Co., Los Angeles, Calif.
DEVELOPMENT OF PLAT PLATE CERAMIC FUEL ELEMENTS, by J. J. Fargo. Summary technical progress rept. no. 26, on Contract AT(04-3)-249. 28 Aug 61, 31p.

HW-71674 $1.60

Hanford Atomic Products Operation, Richland, Wash.
BROACHED NOZZLE STRENGTH FOR CGI-558 AND K-AREA DESIGN NOZZLES, by D. E. Sebade. Summary rept. 13 Nov 61, 11p. 11 refs.

TID-14570 $1.10

Hanford [Atomic Products Operation] Richland, Wash.
DIFFUSION COEFFICIENTS FOR HETEROGENEOUS SYSTEMS, by D. S. Selengut. 12-14 Dec 60, 4p. 1 ref.

HW-69924 $1.60

Hanford Atomic Products Operation, Richland, Wash.
MEASUREMENTS OF RADIOISOTOPES AND TRACE CONSTITUENTS IN THE PRTR D_2O AND HELIUM SYSTEMS, by R. W. Perkins and C. W. Thomas. Rept. on Contract AT(45-1)-1350. 14 June 61, 13p. 2 refs.

HW-73100 $3.00

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT PROGRAMS EXECUTED FOR THE DIVISION OF REACTOR DEVELOPMENT, ed. by S. Goldsmith. Quarterly progress rept. Oct-Dec 61, on Contract AT(45-1)-1350. 1 May 62, 219p. 8 refs.

TID-7025(Vol. 1) $3.50

Kaiser Engineers, Oakland, Calif.
GUIDE TO NUCLEAR POWER COST EVALUATION. VOLUME 1. REFERENCE DATA AND STANDARDS. Rept. on Contract AT(04-3)-334. 15 Mar 62, 272p. 77 refs.

TID-7025(Vol. 2) $1.25

Kaiser Engineers, Oakland, Calif.
GUIDE TO NUCLEAR POWER COST EVALUATION. VOLUME 2. LAND, IMPROVEMENTS, BUILDINGS AND STRUCTURES. Rept. on Contract AT(04-3)-334. 15 Mar 62, 48p.

TID-7025(Vol. 3) $2.50

Kaiser Engineers, Oakland, Calif.
GUIDE TO NUCLEAR POWER COST EVALUATION. VOLUME 3. EQUIPMENT COSTS. Rept. on Contract AT(04-3)-334. 15 Mar 62, 122p.

KAPL-M-PF-6 $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
FLOW AND TEMPERATURE DISTRIBUTION IN A REACTOR FUEL MATRIX COOLED BY FREE CONVECTION TO PLENUM ABOVE, by J. P. Fraser. Rept. on Contract W-31-109-Eng-52. 23 Dec 58, 27p. 6 refs.

PNE-106P $1.00

Lawrence Radiation Lab., U. of California, Livermore.
GNOME POSTSHOT TEMPERATURE AND RADIATION STUDIES. Preliminary rept. 25 June 62, 39p. 26 refs.

UCRL-5973-T $1.10

Lawrence Radiation Lab., U. of California, Livermore.
NUCLEAR EXPLOSIVES AS APPLIED TO MINING AND MINERAL INDUSTRIES, by David D. Rabb. 7 Feb 59, 8p.

LAMS-2720 $0.50

Los Alamos Scientific Lab., N. Mex.
LAMPRE PROGRAM. Quarterly status rept. for period ending 20 May 62 on Contract W-7405-eng-36. 19 June 62, 22p.

LAMS-2722 $0.50

Los Alamos Scientific Lab., N. Mex.
ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX). Quarterly status rept. for period ending 20 May 62 on Contract W-7405-eng-36. 29 June 62, 22p.

MND-M3A-2450 $1.50

Martin [Marietta Corp.] Baltimore, Md.
PM-3A NUCLEAR POWER PLANT PROGRAM. Quarterly progress rept. no. 3, 16 Feb-15 May 61, on Contract AT(30-1)-2700. 21 July 61, 56p.

TID-15429 $2.60

Minnesota U., Minneapolis.
STUDY OF A TWO PHASE COMPRESSIBLE FLOW BY A "GROWING BUBBLE" MODEL, by G. Gavalas. Nuclear Reactor Containment Bimonthly rept. no. 11. Mar 62, 21p. 6 refs.

TID-15012 $6.60

Monsanto Research Corp., Dayton, Ohio.
ORGANIC COOLANT ESSENTIAL DATA, by J. A. Ellard, C. D. King and others. Annual rept. 9 Feb-31 Dec 61, on Contract AT(11-1)-705. 23 Jan 62, 64p.

PB 160 521 $9.60

Navy Electronics Lab., San Diego, Calif.
SURVEY OF NUCLEAR REACTORS AND IRRADIATION FACILITIES AND BIBLIOGRAPHY OF RESEARCH ON EFFECTS OF NUCLEAR RADIATION ON ELECTRONIC COMPONENTS AND MATERIALS, by J. C. Thompson. Rept. for 15 Mar-1 Aug 60. 4 Nov 60, 119p. 1174 refs. Research rept. no. 1001; AD-254 548.

DESCRIPTORS: *Test reactors, Capacitors, *Homogeneous reactors, *Water boiler reactors, *Pressurized water reactors, Semiconductors, *Heterogeneous reactors, *Radiation damage, *Graphite moderated reactors, Transformers, *Electronic equipment, Electron tubes, Inorganic substances, Insulating materials, Resistors, *Bibliography.
This survey consists of (1) a short resume of the general effects of radiation, (2) lists of reactors both domestic and foreign, and (3) a bibliography on the effects of radiation on components and materials. The first table is an alphabetical listing of domestic reactor installations showing their location, groups responsible for operation, and type and thermal power. Tables 2 and 3 list reactors, both foreign and domestic, that were installed primarily as power generation units. Some of these may also be used for research purposes. Tables 4 and 5 list respectively, neutron and gamma sources, available in the United States at research activities. The bibliography is limited to material published prior to 1 July 1960. It is arranged under subject headings to facilitate reference. (Author)

TID-15646 $8.10

North Carolina State Coll., Raleigh.
REACTOR KINETICS ANALYSIS BY AN INVERSE METHOD, by Carrol Reid Bingham. Master's thesis. 1961, 83p. 18 refs.

TID-15337 $1.60

Nuclear Fuel Research Lab., United Nuclear Corp., New Haven, Conn.
SKULL MELTING AND CASTING OF URANIUM MONOCARBIDE, by H. S. Kalish, F. B. Litton, and J. Crane. Rept. on Contract AT(30-1)-2374. 28 Feb 61, 15p. 5 refs.

NYO-2482 $3.50

Nuclear Utility Services, Inc., Washington, D. C.
A REVIEW OF YANKEE OPERATING DATA. Rept. on Contract AT(30-1)-2815. Nov 61, 271p. 4 refs.

ORNL-TM-230 $3.60

Oak Ridge National Lab., Tenn.
SUPER PROMPT CRITICAL BEHAVIOR OF AN UNMODERATED, UNREFLECTED URANIUM MOLYBDENUM ALLOY ASSEMBLY, by J. T. Mihalczo. 10 May 62, 32p.

IDO-16607 (Add.) $2.00

Phillips Petroleum Co., Idaho Falls.
ENGINEERING TEST REACTOR CRITICAL FACILITY CONTROL SYSTEM MANUAL, by F. A. Meichle. Rept. on Contract AT (10-1)-205. 28 July 61, 81p.

IDO-16778 $1.60

Phillips Petroleum Co., Idaho Falls.
PROGRAM FOR IBM 650. REACTOR POWER TRANSIENTS, by K. V. Moore. 1 May 59, 10p.

FXM-411 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
DELAYED NEUTRONS IN FIREBALL, by Phipps Cole. 11 May 53, declassified 9 May 61. 5p.

TIM-483 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FORCED CONVECTION LIQUID METAL INPILE LOOP LIQUID METAL PRESSURE DROP CALCULATIONS, by C. W. Johnson and R. Dreisbach. 3 Nov 58, declassified 9 May 61. 17p. 5 refs.

TIM-499 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FORCED CONVECTION LIQUID METAL INPILE LOOP LIQUID METAL VOLUME CALCULATION, by C. R. Nelson. Rept. on Contract AT(11-1)-299. 26 Sep 58, declassified 9 May 61. 13p.

TIM-554 $2.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FORCED CONVECTION LIQUID METAL INPILE LOOP LOWER END HYDRODYNAMIC TEST, by C. R. Nelson. 30 Apr 58, declassified. 29p. 3 refs.

FXM-837 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
A METHOD FOR CALCULATING THE TEMPERATURE RISE OF THE REACTANT FLUID OUTSIDE THE REGION OF A TURBULENT BOUNDARY LAYER AS A FUNCTION OF AXIAL AND RADIAL POSITION, by T. J. Woods. 17 Aug 54, declassified 9 May 61, 15p.

FXM-507 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
PROCEDURE FOR CALCULATING GAMMA RAY LEAKAGE CURRENTS FROM A SPHERICAL REACTOR, by J. B. Dee. 10 Sep 53, declassified 9 May 61. 3p.

TIM-438 $3.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
TEST OF P2 VERSION OF PESCO IN 2000 GPM WATER LOOP, by M. E. Carroll, Jr. Rept. on Contract AT(11-1)-229. 31 Dec 57, 28p. TID-12291.

PB 160 611 $3.60

Propulsion Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
FAST VERSUS THERMAL REACTORS FOR PROPULSION AND POWER APPLICATIONS, by John E. Brooke and Irving A. Peltier. Rept. 1 Sep-15 Oct 59, on Secondary Power Energy Conversion. May 60, 37p. WADC Technical note 59-415; AD-238 401.

DESCRIPTORS: Fast reactors, Gas cooled reactors, *Reactor moderators, Nuclear propulsion, *Homogeneous reactors, Reactor fuels, Neutron flux density, Diffusion theory, Mathematical analysis, Electric power production.

Nuclear characteristics of fast and thermal reactors are compared on basis of effects of moderator concentration on fuel concentration, flux lethargy, and size of reactor. Most important single nuclear characteristic is the flux lethargy spectrum since it affects reactivity worth of fuel and moderator; thus it is valuable in control and stability problems. Small, bare reactors tend to have fast flux, lethargy spectrums. Void fractions dictate the size of the reactor. Fuel concentration effectively controls fast and completely thermal reactors. In the transition range however, moderator concentration may more effectively control a reactor. For a specific void fraction, a thermal reactor is much larger than a fast reactor. For a specific void volume however, the thermal reactor is not much larger than the fast reactor. (Author)

DP-682 $1.00

Savannah River Lab., Aiken, S. C.
CONTAMINATION AND DECONTAMINATION OF LOW TEMPERATURE, WATER COOLED REACTORS. PART I: DISSOLVED RADIONUCLIDES ON STAINLESS AND MILD STEELS, by A. B. Carlson. Rept. on Contract AT(07-2)-1. Apr 62, 45p. 13 refs.

DP-709 $0.50

Savannah River Lab., Aiken, S. C.
IRRADIATION OF A U-2% Zr FUEL TUBE IN THE VBWR, by H. C. Quigley. Rept. on Contract AT(07-2)-1. Apr 62, 18p. 9 refs.

DP-698 $0.50

Savannah River Lab., Aiken, S. C.
PRESSURE DROP FOR FLOW OF BOILING WATER AT HIGH PRESSURE, by N. Dinos. Rept. on Contract AT(07-2)-1. May 62, 22p. 8 refs.

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Savannah River Lab., Aiken, S. C.
RELAXATION OF TORSIONAL STRESSES IN STAINLESS STEEL DURING IRRADIATION, by R. E. Schreiber. Rept. on Contract AT(07-2)-1. Apr 62, 16p. 4 refs.

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Savannah River Lab., Aiken, S. C.
SAMPLING VALVE FOR REACTOR COOLANT, by L. E. Goodwin. Rept. on Contract AT(07-2)-1. Oct 61, 14p. 2 refs.

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Sylvania-Corning Nuclear Corp., Bayside, N. Y.
AN EVALUATION OF UO_2 STAINLESS STEEL CORE MATERIALS by Herbert S. Kalish and Edmund N. Mazza. Rept. on Contract AT (30-1)-GEN-366. 18 Apr 58, declassified 11 Apr 62. 27p.

TID-14942 $1.10

United Nuclear Corp., White Plains, N. Y.
THE EFFECT OF CLOSING AIR GAPS ON THE REACTIVITY OF THE PULSED REACTOR, by R. P. Sullivan and H. Soodak. Rept. on Contract AT(30-1)-2303. 18 Apr 60, 8p.

GEAP-3905 $1.60

Vallecitos Atomic Lab., Pleasanton, Calif.
MARITIME LOOP IRRADIATION PROGRAM: SAVANNAH I FUEL IRRADIATION, by D. W. Danielson and R. S. Gilbert. Quarterly progress rept. 1 Oct-31 Dec 61, on Contract AT(04-3)-189. 31 Jan 62, 14p. 4 refs.

TID-15638 $7.60

Vanderbilt U., Nashville, Tenn.
THE MEASUREMENT OF THE K SERIES FLUORESCENCE YIELD OR ARGON AND In^{113} WITH A PROPORTIONAL COUNTER SPECTROMETER, by Gordon Ray Harrison. Master's thesis. June 54, 72p. 22 refs.

PNE-126P $0.50

Weather Bureau, Las Vegas, Nev.
WEATHER AND SURFACE RADIATION PREDICTION ACTIVITIES FOR PROJECT GNOME. Preliminary rept. 15 May 62, 23p. 25 refs.

CVNA-141 $10.10

Westinghouse Electric Corp., Pittsburgh, Pa.
SUMMARY REPORT OF THE CVTR ZIRCALOY-4 PRESSURE TUBE FABRICATION DEVELOPMENT AND MECHANICAL PROPERTIES, by E. Landerman, J. R. Reavis and others. Topical rept. on Contract AT(30-1)-2289. June 62, 114p. 14 refs.

Nuclear Reactions

BNL-732(N-6) $0.50

Brookhaven National Lab., Upton, N. Y.
NEUTRON CROSS SECTION EVALUATION GROUP. NEWSLETTER NO. 6, JUNE 1962, by Sophie Moore. 10p. 2 refs.

XDC-60-11-164 $8.60

General Electric Co., Cincinnati, Ohio.
THE STATUS OF NEUTRON CROSS SECTIONS AND RELATED DATA, by A. Prince. Rept. on Contract AT(11-1)-171. 30 Nov 60, 97p.

SUI-61-6 $1.10

Iowa State U., Iowa City.
A GENERALIZED CLUSTER MODEL AND NUCLEAR TRANSMUTATION, by Stanley Bashkin. [1961] 9p. 11 refs.

SUI-61-7 $5.60

Iowa State U., Iowa City.
INVESTIGATION OF THE REACTION Ne^{22} (p, γ) Na^{23}, by Raymond H. Cyr. Master's thesis. June 61, 56p. 11 refs.

UCRL-10130 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
K^- NUCLEON INTERACTIONS IN THE MOMENTUM RANGE OF 800 TO 2900 Mev/c, by Victor Cook. Doctoral thesis. Rept. on Contract W-7405-eng-48. 21 Mar 62, 84p. 30 refs.

UCRL-10126 $1.00

Lawrence Radiation Lab., U. of California, Berkeley.
A STUDY OF THE REACTIONS $K^- + p \rightarrow K+ N+ (\gamma\zeta)$ AT 1.15 Bev/c, by William Graziano. Doctoral thesis. Rept. on Contract W-7405-eng-48. 19 Mar 62, 39p. 15 refs.

UCRL-10125 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
TOTAL CROSS SECTION OF K^- MESONS ON NUCLEONS IN THE MOMENTUM REGION 630 Mev/c TO 1100 Mev/c, by Maung Tin Maung. Doctoral thesis. Rept. on Contract W-7405-eng-48. 15 Mar 62, 86p. 36 refs.

Radioactivity

TID-14424 $1.60

Duquesne Light Co., Shippingport, Pa.
ENVIRONMENTAL RADIATION MONITORING. Quarterly rept. July-Sep 61. 20p.

HASL-127 $3.00

Health and Safety Lab., Atomic Energy Commission, New York.
FALLOUT PROGRAM, by Edward P. Hardy, Jr. Joseph Rivera, and Robert Frankel. Quarterly summary rept. 1 Oct-1 June 62, 245p. 67 refs.

HASL-128 $3.00

Health and Safety Lab., Atomic Energy Commission, New York.
SURVEY OF FALLOUT OPERATIONS. 1 July 62, 102p.

PB 160 583 $4.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE ESTIMATION OF DOSE IN TERMS OF A DOSAGE RATE MEASUREMENT IN AN ATOMIC BOMB RADIATION FIELD, by H. F. Hunter. 11 Aug 50, 43p. Rept. no. AD-234(H).

DESCRIPTORS: *Atomic bomb explosions, Explosions *Radioactivity, Radioactive fall-out, *Dose rate, Determination.

This report has only historical and academic interest. Later information has been developed and should be available through research on the subject.

TID-15398 $2.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
RADIATION DOSE DETERMINATIONS FROM INDIUM FOIL ACTIVITY, by J. C. Bailey. Apr 62, 23p. KSA-204.

TID-15702 $3.60

Vanderbilt U., Nashville, Tenn.
RADIATION MEASUREMENTS BY FREQUENCY VARIATION, by Eugene D. Denman. Master's thesis. June 55, 40p. 6 refs.

Waste Disposal

HW-72215 $1.00

Hanford Atomic Products Operation, Richland, Wash.
PILOT SCALE ALUMINUM BED DECONTAMINATION OF REACTOR EFFLUENT. II. FINAL REPORT, by H. G. Rieck. Rept. on Contract AT(45-1)-1350. Mar 62, 41p. 6 refs.

TID-7628 $7.00

Johns Hopkins U., Baltimore, Md.
GROUND DISPOSAL OF RADIOACTIVE WASTES, comp. by James M. Morgan, Jr., Donald K. Jamison, and John D. Stevenson. Second Conference Proceedings held at Atomic Energy of Canada Limited, Chalk River, Canada, 26-29 September 1961. Rept. on Contract AT(30-1)-477. Mar 62, 644p. 194 refs.

DP-713 $0.50

Savannah River Lab., Aiken, S. C.
CALCINATION OF RADIOACTIVE WASTE IN MOLTEN SULFUR, by M. W. Davis, Jr. E. S. Occhipinti, and C. B. Goodlett. Rept. on Contract AT(07-2)-1. Mar 62, 23p. 8 refs.

PHYSICS

UCRL-9875(Vol. II) $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
LECTURES ON THE S-MATRIX THEORY. Lectures IX-XII, by Henry P. Stapp. Rept. on Contract W-7405-eng-48. 13 Nov 61, 19p.

AD-274 635 $5.60

Westinghouse Research Labs., Pittsburgh, Pa.
ROTATIONAL EXCITATION AND MOMENTUM TRANSFER CROSS SECTIONS FOR ELECTRONS IN H_2 AND N_2 TRANSPORT COEFFICIENTS, by L. S. Frost and A. V. Phelps. Technical rept. no. 9 on Project Defender, Contract Nonr-2584(00). 19 Feb 62, 52p. 45 refs. Scientific paper 62-908-113-P1; ARPA Order no. 125-61 (Amd. 4).

DESCRIPTORS: Rotation, Excitation, Velocity, *Electrons, *Hydrogen, *Nitrogen, Diffusion, *Quantum mechanics, Transport properties, Theory, Statistical distribution, Statistical functions, Elastic scattering, Inelastic scattering, Quadrupole moments.

Rotational excitation and momentum transfer cross sections for low-energy electrons in hydrogen and nitrogen are obtained from a comparison of theoretical and experimental values for the mobility and the diffusion coefficients. The theoretical values of the transport coefficients were obtained by calculating accurate electron energy distribution functions using an assumed set of elastic and inelastic cross sections. The discrete nature of the energy loss occurring in a rotational or vibrational excitation collision was included in the theory, as were collisions of the second kind with thermally excited molecules. The resulting values of drift velocity and characteristic energy, D/μ, were compared with experimental data and adjustments made in the assumed cross sections until good agreement was obtained. The momentum transfer cross sections found in this manner agree well with several recent analyses valid in restricted energy ranges. The final values of the rotational excitation cross sections are 2.5 times the values computed using the theory of Gerjuoy and Stein and the latest available values for the molecular electric quadrupole moments. In hydrogen, the analysis has been extended to energies for which vibrational excitation is important. A vibrational cross section with a maximum of roughly 5×10^{-17} cm^2 at 3 ev is consistent with the measurements. (Author)

Electricity and Magnetism

NASA N62-12464 $1.60

Geophysical Inst., U. of Alaska, College.
THE MAGNETIC FIELD OF A MODEL PROTON BELT, by Syun-Ichi Akasofu, Joseph C. Cain, and Sydney Chapman. Rept. on NASA Grant NsG-201-62. [1962] 11p. 2 refs.

TID-15973 $10.10

Illinois U., Urbana.
MAGNETIC PROPERTIES OF HE^3 AT LOW TEMPERATURES, by William Reese. Technical rept. no. 2 on Research on the Properties of Materials at Low Temperatures, Contract AT(11-1)-1056. Apr 62, 122p. 45 refs.

TID-15915 $4.60

Westinghouse Electric Corp., Cheswick, Pa.
12" SODIUM FLOW CONTROLLER PERMANENT MAGNET COUPLING MAGNETIC REPORT. Rept. on Contract AT(11-1)-681. 18 Aug 61, 36p.

Molecular Physics and Spectroscopy

UCRL-10062 $1.75

Lawrence Radiation Lab., U. of California, Berkeley.
INFRARED ABSORPTION SPECTRA OF METAL AMMONIA SOLUTIONS, by Marvin Gold. Doctoral thesis. Rept. on Contract W-7405-eng-48. Feb 62, 67p. 33 refs.

Y-1393 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
AN IMPROVED MASS SPECTROMETER ANALYZER TUBE ASSEMBLY, by W. W. Rice and A. E. Cameron. Rept. on Contract W-7405-eng-26. 25 May 62, 21p. 4 refs.

TID-15682 $3.

Vanderbilt U., Nashville, Tenn.
THE INFRARED SPECTRUM OF CARBONYL BROMIDE, by Marshall Neil Baldwin. Master's thesis. Mar 57, 37p. 24 refs.

TID-15700 $4.60

Vanderbilt U., Nashville, Tenn.
AN INFRARED STUDY OF HALIDE WINDOW BANDS, by Johnny Hall Dunlap. Master's thesis. June 56, 42p. 3 refs.

Optics

PB 160 627 $5.60

Duntley, S. Q., La Jolla, Calif.
AERIAL MEASUREMENTS OF ATMOSPHERIC CLARITY AND SKY LUMINANCE NEAR ALAMOGORDO, NEW MEXICO. Final rept. on Contract NObs-72039, Task 2. 10 Jan 58, 53p. 17 refs.

Six color photographs will not reproduce.

DESCRIPTORS: *Optics, *Atmosphere, Attenuation, *Sky brightness, Measurement, Optical tracking, *Optical images, Transmission, Visibility, Luminescence, Aircraft, New Mexico.

Included in the report is:
Image transmission by the troposphere I, pub. in Jnl. of the Optical Society of America 47:499-506, June 57
Data on the clarity of the atmosphere as it affects the optical tracking of aerial objects were obtained in the free-flight corridor at Alamogordo, New Mexico, in Oct 56 by means of a specially instrumented B-29 aircraft. This report contains these data together with examples illustrating their use and a discussion of those optical principles which govern apparent contrast and visual detectability. (Author)

TID-3911 $0.75

Kansas U., Lawrence.
THERMOLUMINESCENCE, by Ernest E. Angino and N. Grogler. Bibliography. 22 Mar 62, 30p. Prepared in cooperation with Physikalisches Institut, Universität Bern (Switzerland)

NASA N62-12169 $3.60

Naval Ordnance Lab., Corona, Calif.
PROPERTIES OF PHOTODETECTORS, by W. L. Eisenman, A. B. Naugle, and J. D. Merriam. Rept. no. 50 on Photodetector Series. 15 Mar 62, 38p. 1 ref. NOLC rept. 561.

PB 160 625 $1.10

Visibility Lab., U. of California, San Diego.
INVARIANT IMBEDDING RELATION FOR THE PRINCIPLES OF INVARIANCE, by Rudolph W. Preisendorfer. Rept. on Contract NObs-72092. 15 Oct 57, 8p. 6 refs. SIO Ref. 57-45; AD-156 348.

DESCRIPTORS: Light, *Light transmission, *Neutrons, *Transport theory, *Optics, Tensor analysis, Operators (Mathematics), Groups (Mathematics).

An explicit analytic embodiment is exhibited of the principle for radiative transfer and neutron transport processes.

PB 160 626 $1.60

Visibility Lab., U. of California, San Diego.
TIME-DEPENDENT PRINCIPLES OF INVARIANCE, by Rudolph W. Preisendorfer. Rept. on Contract NObs-72092. 25 Nov 57, 12p. 9 refs. SIO Ref. 57-51.

DESCRIPTORS: Light, *Light transmission, Neutrons, Transport properties, *Optics, Tensor analysis, Functions, Operators (Mathematics).

The formulation is exhibited of the requisite statements of the four time-dependent principles of invariance and it is shown that they are sufficient to derive the functional relations governing the time-dependent R and T functions and their corresponding integral operator.

Solid State Physics

PB 160 623 $1.60

Armour Research Foundation, Chicago, Ill.
SYNTHESIS OF REFRACTORY MIXED OXIDE WITH PEROVSKITE STRUCTURE, by S. Bradstreet and Y. Harada. Final rept. 24 May-24 Dec 60, on Contract NOw-60-0235-c. 22 Nov 60, 20p. 2 refs. ARF 6046; AD-251 214.

DESCRIPTORS: *Barium compounds, *Thorium compounds, Oxides, Synthesis, Crystal structure, Crystals, Lattices, Decomposition, Hydrolysis, Temperature, Dielectric properties, Ferroelectric crystals, Ferromagnetic materials, *Refractory materials, Preparation.

$BaThO_3$ is the most stable compound in the Ba-Th-O system. It forms readily from a coprecipitated mixture of the Ba and Th oxalates at 750 C and the reaction is driven to completion below 1000 C in the presence of an excess of Ba. It is cubic at ordinary temperature, with the perovskite structure; its lattice parameter is within the limits postulated by packing theory for consistent ionic radii, 4.497+ or −.005 a. u.; its calculated crystal density is 4.59 gm/cc; it exists as a solid at 2300 C, although dissociation to BaO and ThO_2 commences at lower temperatures. It appears to be ferroelectric, with a Curie temperature of 260 C. $BaThO_3$ appears to hydrolyze readily in the presence of moisture and/or CO_2. (Author)

TID-14001 $3.60

Brown U., Providence, R. I.
RADIATION EFFECTS ON SOLIDS, by Rohn Truell. Annual rept. on Contract AT(30-1)-1772. 1961, 33p.

PB 160 579 $3.60

David Sarnoff Research Center, Princeton, N. J.
THERMOELECTRIC MATERIALS FOR POWER CONVERSION, by B. Abeles, G. D. Cody and others. Quarterly progress rept. no. 5, 1 Feb-30 Apr 60, on Contract NObs-77057. 15 May 60, 37p. 31 refs. AD-245 046.

DESCRIPTORS: *Thermoelectricity, *Electric power production, *Semiconductors, Tellurides, Silicides, Cobalt compounds, Bismuth compounds, Magnesium compounds, Cadmium compounds, Intermetallic compounds, Electrical properties, Diffusion, Electrical properties, Diffusion, Electrical conductance, Resistance.

A study was made of ternary compounds and their alloys, metal silicides, and alloy systems involving the bismuthides and antimonides of magnesium and cadmium. In addition preliminary results are reported for the analysis of thermal diffusivity measurements of $AgSbTe_2$ at temperatures up to 370°C.

NYO-10086 $1.60

Fundamental Methods Associates, New York.
FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING, by Carl N. Klahr. Quarterly progress rept. no. 2, Mar-June 62, on Contract AT(30-1)-2914. 2 July 62, 15p. FM-12.

TID-16111 $3.60

Illinois U., Urbana.
DIFFUSION IN SOLIDS, by David Lazarus. Progress rept. on Contract AT(11-1)-1102. 1 June 62, 40p.

TID-14429 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
CHARACTERISTICS AND ANNEALING OF NEUTRON IRRADIATED PbTe, by J. C. Corelli and D. M. Amorosi. Nov 61, 9p. 5 refs.

MND-2584 $6.60

Martin [Marietta Corp.] Baltimore, Md.
RADIOISOTOPE SEMICONDUCTOR AND THERMOELEMENT, by J. B. Weddell. Quarterly progress rept. no. 1, 13 Feb-31 May 61, on Contract AT(30-1)-2698. 27 June 61, 64p. 10 refs.

UNM-PR-EE-28 $2.60

New Mexico U. Engineering Experiment Station, Albuquerque.
SURFACE STUDIES ON REDUCED TITANIUM DIOXIDE INVOLVING INJECTION REAGENTS AND CONTACT FORMING, by Richard Bechtel, Goebel Davis Jr., and others. May 61, 23p. 4 refs. SCDC-2345.

K-1526 $2.75

Oak Ridge Gaseous Diffusion Plant, Tenn.
AN IBM 7090 PROGRAM FOR COMPUTING THE FERMI LEVEL IN NON METALS, by J. W. Miller. Rept. on Contract W-7405-eng-26. 25 June 62, 154p. 25 refs.

PB 160 578 $1.10

Ohio State U. Research Foundation, Columbus.
THERMOELECTRIC MATERIALS, by Henry E. Wenden, S. R. Ali Zaidi, and Thomas E. Shevlin. Bimonthly progress rept. 1 May-30 June 60, on Contract NObs-78254. 6 July 60, 5p. RF Proj. 1039, rept. no. 3. AD-246 194.

DESCRIPTORS: *Thermoelectricity, Temperature, Voltage, *Sodium compounds, *Vanadium compounds, *Oxides, Electrons, Hydrogen, Oxygen, Helium, Scattering.

Study was concerned with the effect of temperature difference on the e. m. f. (in microvolts/degree C.) in the molten temperature range of Na2O. 6V2O5 (sodium oxide. vanadium pentoxide), referred to as NV6. The effect of hydrogen, helium, and oxygen atmospheres was studied. The hot end state (state H) approaches V+5 and attendant coordination, and the cold end state (state C) approaches V+4 and attendant coordination. The suggestion is made that the reducing atmosphere at the hotter end of the molten NV6 tends to change state H to that of state C, thus lowering the energy difference between the excited electrons in the hot and cold ends of the tube, and reducing the flow of electrons or e. m. f. per degree temperature difference. The other factor affecting the flow of the electrons may be their collision with phonons and other electrons rebounding in a random path, affecting the free path length of the electrons. The e. m. f. generated due to the Seebeck effect is inversely related to the temperature gradient between the hot and cold ends.

TID-14693 $1.60

Purdue Research Foundation, Lafayette, Ind.
BASIC RADIATION DAMAGE STUDIES. Technical progress rept. on Contract AT(11-1)-125. 15 Dec 61, 10p. 4 refs.

TID-14984 $1.60

Sandia Corp., Albuquerque, N. Mex.
ALPHA QUARTZ PIEZOELECTRIC CONSTANT FOR HIGH TRANSIENT STRESS, by R. A. Graham. 12 Jan 62, 16p. 11 refs.

TID-15694 $8.10

Vanderbilt U., Nashville, Tenn.
THE PHOSPHORESCENCE OF X RAY EXCITED FLUORITE FROM -4.5°C TO 120°C, by Ross L. Floyd. Master's thesis. Jan 54, 89p. 9 refs.

Theoretical Physics

TID-14953 $1.60

Stevens Inst. of Tech., Hoboken, N. J.
EXPERIMENTAL INVESTIGATION OF CUSPED CONTAINMENT GEOMETRIES: CHALICE. Semi-annual rept. 1 June-1 Dec 61, on Contract AT(30-1)-2582. 18p. SIT-P56(1/62)

TID-15399 $1.60

Stevens Inst. of Tech., Hoboken, N. J.
INVESTIGATIONS IN PLASMA DYNAMICS, by George Schmidt. Annual summary rept. 18p. 13 refs.

Thermodynamics

PB 160 632 $1.60

Heat Transfer Lab., Mass. Inst. of Tech., Cambridge.
DESCRIPTION OF BOILING PROJECT BURNOUT DETECTOR, by M. W. Raymond and J. M. Reynolds. Technical rept. no. 11 on Contracts N5ori-07894 and Nonr-[1841](39). 1 July 57, 17p. D.S.R. Proj. no. 7-7673; AD-235 388.

DESCRIPTORS: *Boiling, Nucleate boiling, *Heat transfer, Convection, *Detectors, Design.

A mechanism was devised which will interrupt the heating current circuit within 6 millisec of the initiation of the burnout process.

NASA N62-12473 $3.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
LAMINAR HEAT TRANSFER IN CHANNEL WITH UNSTEADY FLOW AND WALL HEATING VARYING WITH POSITION AND TIME, by R. Siegel and M. Perlmutter. [1962] 33p. 11 refs.

NASA N62-12470 $7.60

National Bureau of Standards, Boulder, Colo.
CRYOGENIC RESEARCH AND DEVELOPMENT. Progress rept. no. 5, period ending 31 Mar 62. 31 Mar 62, 78p. 5 refs. NBS rept. 7246.

K-1528 $2.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
SIFT AN IBM-7090 CODE FOR COMPUTING HEAT DISTRIBUTIONS, by David Bagwell. Rept. on Contract W-7405-eng-26. 6 July 62, 120p. 1 ref.

PB 160 628 $3.60

Tennessee U., Knoxville.
DESIGN OF A CRYOGENIC PUMPING SYSTEM, by R. L. Young. Rept. on Contract AF 40(600)800. Nov 60, 31p. 9 refs. AEDC-TN-60-205; AD-246 022.

DESCRIPTORS: *Pumps, Design, *Cryogenics, High altitude, Simulations, Thermodynamics, Theory, Low temperature research.

Methods are presented for predicting the performance of a cryogenic pump system. In particular, the effect of the number of plates on the performance of a specific cryogenic pump is considered. It was concluded that a pump with a relatively small number of plates best suits the requirements of the specific system considered. Finally, the methods presented are shown to be useful in considering other aspects of the cryogenic pump system. (Author)

Wave Propagation

PB 160 614 $11.00

Armour Research Foundation, Chicago, Ill.
DIFFRACTION PHENOMENA IN SEMI-SOLIDS, by W. F. Riley and A. J. Durelli. Final rept. 1 Nov 54-31 Jan 56, on Contract AF 33(616)2695. [1956] 144p. 28 refs. ARF no. K063.

DESCRIPTORS: *Solids, *Photoelastic materials, Stresses, Propagation, *Diffraction, Wave transmission, *Wave analysis, Elasticity, Friction, Materials, Gelatin, Polymers, Esters, Epoxy resins, Resins, High speed photography, Disks, Photoelasticity.

A method was developed which utilizes dynamic photoelasticity and grid measurements for studying the propagation of stress waves around obstructions of various shapes partially or completely embedded in a homogeneous, isotropic, elastic medium. A special wave-transmitting medium (a modified form of Ciba Araldite 502) was developed which permitted the recording of a propagating stress wave using the commercially available Fastax Camera. The experimental and photographic techniques were developed to the point where clear, precise photoelastic fringe patterns were obtained. An embedded grid network was also developed for use in measuring displacements and strains. The experimental method was then applied to several simple cases (struts, beams, disks, and rings), and the results were compared with theoretical predictions where possible. An investigation of the mechanical properties of the wave-transmitting medium which was developed showed that, under dynamic conditions of loading, the behavior is quite complex. Both the modulus of elasticity and the stress

fringe value were found to be dependent upon the rate of loading. Since a similar relationship for the modulus of elasticity is found in many types of soil, this model method appears to be a promising way of approaching the problem of stress wave propagation in soils. It is also possible that this method could be applied in the future to a study of three-dimensional problems involving a nonhomogeneous medium. (Author)

PB 160 605 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MATHEMATICAL MODEL FOR THE RADAR ECHO FROM A RANDOM COLLECTION OF SCATTERERS, by E. J. Kelly and E. C. Lerner. Rept. on Contract AF 19(122)458. 15 June 56, declassified 1 Feb 59. 23p. 4 refs. Technical rept. no. 123; AD-104 260

DESCRIPTORS: *Radar echo areas, *Radar signals, *Radar reflections, Scattering, Statistical processes, Statistical functions, Correlation techniques, Probability, Meteorology.

A model for the radar echo from a random collection of scatterers is described which exploits the mathematical analogy to the shot effect. The model yields a Gaussian random process in the limit of large density of scatterers, but it also enables one to make straightforward calculations of specific properties of the echo in cases where the effects of finite density may be important. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 160 519 $1.60

Navy Electronics Lab., San Diego, Calif.
DEVELOPMENT OF A SERIES OF GENERAL-PURPOSE RADIO COMMUNICATION RECEIVERS, by W. A. Daigle and T. H. Hamm. Final rept. 28 Jan 60, 17p. 4 refs. Research and development rept. 952; AD-254 539.

DESCRIPTORS: Very low frequency, Low frequency, Medium frequency, Radio equipment, *Radio receivers, *Naval communications, Reliability, Maintenance, Design, Submarines, Shipborne, *Communications equipment, Tests, *Electronic circuits, Preamplifiers, Radio frequency amplifiers, Power supplies, Tuning devices, Electron tubes, Shielding, Manufacturing methods.

Breadboard models of the common receiver sections in a VLF/LF receiver and the RF section covering the 233-to-600-kc frequency range were built. The objective was the best possible compromise between simplicity, high reliability and maintainability, and good performance. The design includes modular construction of receiver sections, a greatly improved tube shield, and other features which should be incorporated in replacements for existing general-purpose radio communications receivers. (Author)

AD-258 365 $18.50

Collins Radio Co., Cedar Rapids, Iowa.
SERVICE TEST MODELS OF RADIO SET AN/URC-9(XN-1)X AND RADIO SET CONTROL C-2384(XN-1)/URC, by W. J. Simmons. Final development rept. 15 June 58-21 Dec 60, on Contract NObsr-75188. 1 Feb 61, 300p. Rept. no. CER-1251.

DESCRIPTORS: *Test sets, *Radio equipment, *Radio communication systems, Very high frequency, Ultra high frequency, Shipborne, *Naval communications, Radiofrequency spectrum analyzers, Reliability, *Transmitter receivers, Communication systems, Model tests.

SOCIAL SCIENCES

PB 160 621 $8.60

California U., Los Angeles.
ESTIMATION PROBLEMS IN INVENTORY CONTROL, by Yoichiro Fukuda. Doctoral thesis. Rept. on Contract Nonr-233 (02). May 60, 92p. 9 refs. Management Sciences Research Proj. Research rept. no. 64; AD-237 616.

DESCRIPTORS: *Scheduling, Mathematical analysis, *Statistical functions, *Probability, *Management engineering, Costs.

The estimation of the optimal policy in the inventory problems is considered in which the probability distribution function of demand is specified only to the extent of its belonging to a given set of distribution functions. In the parametric method, the distribution function of demand is assumed to belong to certain parametric families of distribution functions, and the estimate of the optimal policy is obtained by use of the maximum likelihood estimator of the parameter. The asymptotic behavior of the estimate policy is studied under various restrictions on the cost functions. In the nonparametric method, the demand distribution is specified to belong to the set of distribution functions with given mean and variance. The existence of the minimax policy which minimizes the maximum expected operation costs over the given set of distribution functions is studied under various restrictions on the cost functions. (Author)

PB 160 631 $8.10

Ohio State U., Research Foundation, Columbus.
DOZOKU: A PRELIMINARY STUDY OF THE JAPANESE "EXTENDED FAMILY" GROUP AND ITS SOCIAL AND ECONOMIC FUNCTIONS (BASED ON RESEARCHES OF K. ARIGA) by Michio Nagai. Interim technical rept. no. 7 on Japanese Social Relations, Contract Nonr-495(03). Sep 53, 86p. 96 refs. RF Proj. 483; AD-35 670.

DESCRIPTORS: *Culture, *Group dynamics, Economics, Political science, Rural areas, Japan.

A description and a preliminary functional analysis are given of the dozoku system of relationships in Japanese rural society. The dozoku is a composite body of both true kin (blood and adopted relatives) and fictitious or

ritual kin; the system was organized as a cooperative body for conducting economic, political, and ceremonial activities in the community. In the development of the Japanese rural community from feudal or traditional forms, the dozoku has played a larger role than either the family system (honke-bunke) or the kumi, a voluntary cooperative organization. The dozoku serves the same broad needs that are served by the oyabun-kobun system (AD-31 249). Certain general structural and functional characteristics of the dozoku group are defined, and a typical case of dozoku grouping, the Saito dozoku in Ishigami village, is considered in detail. A discussion is given of the role of dozoku in Japanese society and the reasons for its persistence.

Documentation

Order from GPO $0.60 as
Y 4. R86/2:D44

Committee on Rules and Administration, United States Senate, Eighty-Seventh Congress, Second Session.
DEPOSITORY LIBRARIES, HEARINGS BEFORE THE SUBCOMMITTEE ON THE LIBRARY, 87th CONGRESS 2D SESSION, ON S. 2029 AND H. R. 8141 TO REVISE THE LAWS RELATING TO DEPOSITORY LIBRARIES, MARCH 15 AND 16, 1962. [1962] 241p. 26 refs.

DESCRIPTORS: *Libraries, Federal government, Documentation, Control, Political science.

Order from GPO $3.00 as
FS 2. 209:B52

National Library of Medicine, Washington, D. C.
BIOMEDICAL SERIALS, 1950-1960. A SELECTIVE LIST OF SERIALS IN THE NATIONAL LIBRARY OF MEDICINE, comp. by Lila M. Spanier. 1962, 503p. 8,939 refs. Public Health Service Publication no. 910.

DESCRIPTORS *Medicine, Indexes, Documentation, *Libraries, Periodicals.

This list is intended primarily as a guide to the substantive biomedical serials of which the National Library of Medicine holds at least one issue for 1950 or later. Serials which began after 1960 are not included. Serials with subject matter within the scope of the Library's collecting policies were considered for inclusion; serials acquired for administrative or working purposes were automatically excluded. In general, only serials issued more frequently than annually were included. Monographic serials, review journals, and proceedings and transactions of societies and institutions constituted an exception to this rule, because of the generally substantive nature of their contents. Proceedings and transactions of congresses were not included.

MISCELLANEOUS

PB 181 075 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Aug 62.

DESCRIPTORS: *Naval research, *Scientific research, Navigation, *Hypervelocity guns, Accelerators, Wave transmission, Very low frequency, *Atmosphere, *Astrophysics, Water vapor, India, *Chemistry, Amines, Purification, Submarines, Nuclear propulsion, *Electricity, Ultraviolet radiation, Plastics, Spaceships, *Solar cells, *Mathematics, *Mechanics, Fracture (Mechanics), Steel, Radiation effects, Impact shock, *Metallurgy, *Ceramic materials, Fatigue (Mechanics), Rupture, Wire, Copper, Nickel, Oxygen, Hardening, Niobium alloys, Coatings, Iron, Standards, Titanium alloys, Sea water, Electrochemistry, *Nuclear physics, Thermal neutrons, Neutron diffraction analysis, Reactor cores, Alpha particles, Detection, Photographic emulsions, Protons, Electrons, Range, Aluminum, Silicon, Dioxides, *Radio, Functions, Simultaneous equations, Digital computers, Electron tubes, Cathodes, Dielectrics, *Solid state physics, Gadolinium, Glass, Ammeters, Scientific reports, Patents.

Contents:
Articles:
The Omega Navigation System, by J. W. Brogden, A. W. Coven, and M. F. Williams
NRL Hypervelocity Accelerator (Three-Inch Light-Gas Gun), by S. M. Halperson, R. H. Fuller, and H. V. Schlemmer
Antipodal Effects in VLF Propagation, by W. E. Garner and F. J. Rhoads
Scientific Program:
Atmosphere and Astrophysics: Vertical distribution of water vapor over Hyderabad, India, and comparison with midlatitude distribution
Chemistry: Investigation of fatty amine monolayers by contact potentials. Second annual progress report on the present status of chemical research in atmosphere purification and control on nuclear-powered submarines
Electricity: Effects of ultraviolet radiation on transparent plastics for mounting solar cells on space vehicles
Mathematics: Three theorems concerning stable vertices in linear graphs
Mechanics: Effect of notch tip sharpness on the apparent fracture toughness of H-11 material. New remotely operated, gas-actuated loader for studying fracture toughness and yield strength of steels damaged by irradiation. Extended utility of the Navy high-impact shock machine for mediumweight equipment
Metallurgy and Ceramics: Low temperature fatigue cracks of deliberate fracture origins. Electron fractographic examination of ductile rupture tearing in a notched wire specimen. Effect of oxygen impurity on the fatigue life of copper and nickel. Monentum accumulation during high-speed solidification. Oxidation-resistant coatings for niobium alloys. Preparation and properties of hydrogen-reduced, consumable-electrode, arc-melted electrolytic iron.

Standardizing procedures for the NRL drop weight test. Effect of electrochemical potential on fatigue of high-strength titanium alloy in salt water

Nuclear and Atomic Physics: Neutron diffractometer measurement of the slow-neutron spectrum from a modified split reactor core. Detection of alpha particles in the presence of heavy gamma-ray background by Ilford nuclear emulsions. Range-energy relations for protons and electrons in aluminum, silicon, and silicon dioxide

Radio: Methods for solving simultaneous equations and implicit functions and for generating functions with the Bendix DA-1 digital differential analyzer. Effect of applying various dielectric coatings on electron tube cathodes to suppress prebreakdown electron emission

Solid State Physics: Stimulated emission of ultraviolet radiation from gadolinium-activated glass

Supporting Techniques: Conversion of Microammeter to Logarit mic Scale

Published Reports

A D INDEX

AD No.	Div.
276 501	9
276 502	8
276 503	8
276 504	1
276 506	20
276 507	6
276 508	20
276 509	22
276 510	30
276 511	22
276 513	16
276 515	33
276 516	33
276 519	15
276 520	25
276 521	9
276 522	8
276 523	25
276 524	4
276 525	14
276 527	8
276 528	25
276 529	27
276 530	8
276 531	6
276 532	32
276 533	30
276 534	15
276 535	25
276 536	15
276 537	26
276 538	2
276 542	2
276 543	12
276 544	9
276 545	15
276 547	17
276 550	25
276 551	8
276 553	25
276 554	8
276 555	17
276 556	26
276 558	18
276 562	4
276 563	4
276 564	5
276 567	25
276 568	30
276 569	6
276 570	9
276 573	4
276 574	30
276 575	14
276 577	25
276 578	20
276 579	25
276 582	30
276 583	14
276 584	26
276 588	30
276 589	9
276 591	30
276 592	28
276 593	30
276 594	30
276 597	25
276 598	8
276 599	14
276 600	14
276 603	2
276 604	2
276 605	22
276 606	2

AD No.	Div.
276 607	2
276 608	2
276 609	2
276 610	2
276 618	5
276 619	16
276 620	17
276 621	14
276 622	28
276 624	25
276 626	9
276 627	24
276 628	25
276 629	16
276 631	31
276 633	15
276 634	16
276 635	20
276 637	8
276 638	8
276 639	6
276 640	16
276 641	1
276 642	27
276 643	8
276 644	17
276 645	25
276 647	6
276 648	25
276 649	7
276 650	25
276 651	17
276 652	17
276 654	5
276 656	14
276 657	13
276 658	25
276 659	8
276 662	27
276 663	24
276 664	15
276 665	4
276 666	14
276 667	28
276 668	8
276 669	4
276 670	22
276 674	8
276 675	8
276 684	12
276 685	15
276 686	15
276 692	30
276 693	17
276 694	17
276 696	6
276 697	8
276 698	28
276 699	8
276 700	13
276 702	28
276 703	30
276 704	30
276 705	25
276 706	25
276 707	25
276 709	14
276 710	2
276 711	4
276 712	8
276 713	10
276 714	9
276 715	30
276 716	17

AD No.	Div.
276 717	15
276 718	15
276 719	16
276 720	8
276 721	12
276 724	30
276 726	25
276 727	25
276 728	12
276 730	8
276 735	17
276 736	25
276 737	25
276 738	25
276 744	8
276 745	20
276 746	24
276 747	25
276 748	4
276 749	25
276 800	32
276 801	7
276 802	20
276 803	25
276 804	7
276 805	13
276 806	16
276 807	22
276 812	2
276 814	30
276 819	9
276 822	9
276 826	8
276 827	28
276 828	28
276 829	28
276 830	28
276 831	28
276 832	28
276 833	2
276 834	16
276 837	22
276 838	29
276 839	25
276 840	22
276 841	25
276 843	15
276 844	20
276 845	8
276 847	5
276 848	15
276 855	12
276 857	16
276 858	28
276 859	7
276 860	28
276 862	6
276 864	15
276 865	14
276 867	14
276 868	14
276 869	9
276 870	4
276 871	17
276 872	25
276 873	1
276 874	9
276 875	15
276 876	15
276 878	12
276 879	2
276 880	8
276 881	7
276 882	26

AD No.	Div.
276 887	25
276 888	8
276 890	32
276 894	8
276 895	30
276 897	8
276 898	22
276 901	17
276 902	17
276 903	2
276 904	28
276 905	8
276 906	25
276 907	30
276 908	12
276 909	9
276 910	9
276 911	22
276 912	30
276 914	17
276 916	8
276 917	15
276 918	20
276 920	25
276 922	25
276 923	23
276 924	4
276 926	20
276 927	16
276 928	20
276 930	28
276 933	32
276 934	20
276 935	2
276 937	25
276 938	26
276 940	8
276 941	25
276 945	32
276 946	32
276 947	23
276 950	22
276 953	8
276 955	10
276 959	25
276 960	25
276 961	25
276 962	26
276 964	8
276 965	30
276 966	14
276 967	2
276 971	22
276 972	8
276 977	9
276 978	2
276 979	25
276 980	15
276 982	17
276 983	14
276 984	12
276 985	17
276 986	22
276 987	8
276 988	16
276 989	8
276 990	15
276 991	4
276 992	26
276 994	31
276 996	14
276 997	31
276 999	30

NUMBER INDEX

Number	Page
AAL TN-59-8	S-3
AAL TN-59-9	S-3
AAL TN-59-10	S-3
ACCO-2	S-32
ACCO-3	S-32
ACCO-7	S-32
ACCO-9	S-32
ACCO-12	S-32
ACCO-26	S-32
ACCO-34	S-32
ACCO-44	S-32
ACNP-6103	S-39
ACNP-62010	S-39
AD-5753	S-8
AD-8348	S-31
AD-11 753	S-29
AD-11 840	S-18
AD-17 047	S-21
AD-17 865 superseded	S-5
AD-19 098	S-30
AD-27 866	S-9
AD-35 670	S-50
AD-36 867	S-23
AD-43 738	S-23
AD-57 889	S-22
AD-63 571	S-26
AD-65 813	S-22
AD-80 323	S-30
AD-83 017	S-2
AD-84 248	S-22
AD-89 460	S-2
AD-89 543	S-2
AD-98 996	S-7
AD-98 998	S-6
AD-101 303	S-7
AD-104 260	S-50
AD-107 993	S-15
AD-110 729	S-13
AD-129 944	S-4
AD-135 080	S-27
AD-135 305	S-14
AD-142 062	S-17
AD-156 348	S-47
AD-159 622	S-2
AD-206 654	S-5
AD-206 670	S-22
AD-207 308	S-32
AD-215 126	S-22
AD-216 341	S-21
AD-217 483	S-17
AD-223 156	S-25
AD-223 157	S-25
AD-227 276	S-31
AD-231 135	S-18
AD-231 572	S-33
AD-232 141	S-2
AD-232 634	S-6
AD-235 195	S-19
AD-235 388	S-49
AD-236 886	S-23
AD-237 616	S-50
AD-238 401	S-44
AD-239 350	S-34
AD-240 081	S-20
AD-245 046	S-48
AD-245 775	S-15
AD-245 858	S-17
AD-245 861	S-15
AD-246 022	S-49
AD-246 194	S-48
AD-246 266	S-20
AD-246 266	S-33
AD-246 772	S-31
AD-248 428	S-18
AD-250 490	S-26
AD-250 821	S-20
AD-251 214	S-47
AD-251 378	S-8
AD-252 952	S-15
AD-253 127	S-16
AD-254 459	S-20
AD-254 539	S-50
AD-254 546	S-19
AD-254 548	S-43
AD-258 291	S-13
AD-258 365	S-50
AD-274 617	S-20
AD-274 635	S-46
AD-319 372 superseded	S-25
AEDC-TN-60-205	S-49
AEWES TR-3-455, R-1	S-14
AF TR-6688	S-30
AFOSR-TN-59-102	S-16
ANL-6268	S-32
ANL-6542	S-28
ANL-6552	S-39
ANL-6561	S-39
ANL-6573	S-39
ANPG-04686	S-26
APEX-155	S-41
APEX-800(Pt. A)	S-41
APEX-800(Pt. B)	S-40
APEX-800(Pt. F)	S-40
ARF-1167-18	S-38
ARF-6046, FR	S-47
ARF-K063, FR	S-49
AROD-996-3	S-30
AROD-1822	S-23
ARPA Order 125-61	S-46
ATI-144-414	S-9
ATI-159 574	S-30
ATI-173 233	S-23
BAW-163	S-39
BAW-1237	S-39
BM IC-8099	S-10
BMI-1580	S-34
BMI-X-198	S-34
BNL-710(T-247)	S-1
BNL-725(T-259)	S-28
BNL-727(T-260)	S-6
BNL-732(N-6)	S-45
BNL-737(T-266)	S-38
BNL-5830	S-40
BRL-853	S-21
BRL-906	S-30
BRL-1071	S-21
CEND-150(Pt. IV)	S-40
COLL CER-1251	S-50
Court-39	S-13
Court-58	S-13
CRDLR-3068	S-13
CSLILU R-68	S-2
CSLILU R-69	S-2
CSLILU R-70	S-2
CVNA-130	S-37
CVNA-141	S-45
DASA-291, v. 1	S-25
DASA-291, v. 2	S-25
DASA-406 superseded	S-5
DASA-867	S-5
DASA-968	S-5
DASA-970	S-5
DC-51-11-26	S-27
DC-52-4-37	S-41
DC-52-25-70	S-40
DC-52-28-55	S-41
DC-57-3-19	S-34
DC-57-4-76	S-41
DC-57-5-78	S-41
DC-57-10-98	S-31
DC-58-1-89	S-26
DC-58-1-90	S-35
DC-58-1-162	S-18
DC-58-1-191	S-41
DC-58-2-166	S-29
DC-58-2-195	S-36
DC-58-2-206	S-41
DC-58-2-215	S-35
DC-58-3-37	S-41
DC-58-3-128	S-41
DC-58-3-147	S-29
DC-58-8-192	S-41
DC-58-9-35	S-41
DC-59-3-200	S-27
DC-59-5-41	S-21
DC-59-6-15	S-18
DC-59-12-216	S-41
DC-59-18	S-27
DC-60-1-108	S-41
DC-60-1-146	S-29
DC-60-2-209	S-41
DC-60-3-77	S-21
DC-61-6-17	S-25
DCL-58-2-39	S-40
DCL-59-8-93	S-27
DDC-1008	S-17
DLCS-5000562	S-35
DP-652	S-39
DP-658	S-44
DP-669	S-44
DP-682	S-44
DP-693	S-38
DP-698	S-44
DP-709	S-44
DP-713	S-46
DSR-7-7673, R-11	S-49
DTMB-870, rev.	S-29
EXP-223	S-27
EXP TM-952	S-27
FI F-A2063	S-23
FI I-2358-8	S-23
FI I-2448-1	S-22
FI I-2448-2	S-22
FI I-2448-3	S-22
FI RR-331	S-23
FMCC-(B) PC-1	S-18
FXM-411	S-43
FXM-507	S-44
FXM-837	S-43
GAMD-1318	S-40
GAMD-2885	S-28
GEAP-3905	S-44
GEAP-4012	S-40
GEMP-123	S-36
GNEC-220	S-40
GNEC-230	S-40
GPO-62-11038 (GPO Y 3. At7: 2W37/962)	S-35
GPO-62-11040 (GPO Y 3. At7: 2W37/962/comp.)	S-36
GPO-62-11058 (GPO C 41. 2:N88)	S-38
GPO-62-11062 (GPO C 41. 2W45/2)	S-26
GPO-62-11673 (GPO Y 4. R86/2:D44)	S-51
GPO-62-11890 (GPO I 19. 16:378-B)	S-11
GPO-62-11891 (GPO I 19. 16:411-C)	S-9
GPO-62-11892 (GPO I 19. 16:450-B)	S-10
GPO-62-11893 (GPO I 19. 16:500-A)	S-10
GPO-62-11894 (GPO I 19. 13:1459-I)	S-10
GPO-62-11897 (GPO I 19. 13:1619-U)	S-10
GPO-62-11898 (GPO I 19. 13:1702)	S-12
GPO-62-11899 (GPO I 19. 13:1704)	S-12
GPO-62-11900 (GPO I 19. 13:1708)	S-12
GPO-62-11901 (GPI I 19. 13:1711)	S-12
GPO-62-12377 (GPO I 28. 27:8099)	S-10
GPO-62-12404 (GPO I 28. 37/a: M564/961	S-32
GPO-62-12510 (GPO NAS 1. 2:M56)	S-11
GPO-62-12512 (GPO NAS 1. 2:Sp1/4/962)	S-1
GPO-62-12534 (GPO FS 2. 209:B52)	S-51
GPO-62-12556 (GPO D 213. 8/3:965)	S-1
GPO-62-12607 (GPO D 217. 2:M66)	S-24
GPO C 41. 2:N88	S-38
GPO C 41. 2W45/2	S-26
GPO D 213. 8/3:965	S-1
GPO D 217. 2:M66	S-24
GPO FS 2. 209:B52	S-51
GPO I 19. 13:1459-I	S-10
GPO I 19. 13:1619-U	S-10
GPO I 19. 13:1702	S-12
GPO I 19. 13:1704	S-12
GPO I 19. 13:1708	S-12
GPO I 19. 13:1711	S-12
GPO I 19. 16:378-B	S-11
GPO I 19. 16:411-C	S-9
GPO I 19. 16:450-B	S-10
GPO I 19. 16:500-A	S-10
GPO I 28. 27:8099	S-10
GPO I 28. 37/a:M564/961	S-32
GPO NAS 1 2:M56	S-11
GPO NAS 1. 2:Spl/4/962	S-1
GPO Y 3. At7: 2W37/962	S-35
GPO Y 3. At7: 2W37/ 962/comp.	S-36
GPO Y 4. R86/2:D44	S-51
Grant NSF G-15011	S-19
GS PP-411-C	S-9
GS PP-450-B	S-10
GS PP-500-A	S-10
GS WSP-1459-I	S-10
GS WSP-1619-U	S-10
GS WSP-1702	S-12
GS WSP-1704	S-12
GS WSP-1708	S-12
GS WSP-1711	S-12
HASL-127	S-45
HASL-128	S-45
HW-69924	S-42
HW-71674	S-42
HW-72215	S-46
HW-73100	S-42
HW-73116	S-36
IDO-12021	S-25
IDO-14564	S-14
IDO-16607 (Add.)	S-43
IDO-16778	S-43
IER-82-8	S-31
ILU CES-SR-51	S-29
IS-351	S-33
IS-421	S-9
IS-448	S-27
IST-2144-272-T	S-22
JPR RM-53-2	S-26
K-1433	S-8
K-1525	S-29
K-1526	S-48
K-1528	S-49
K-1529	S-38
KAPL-M-PF-6	S-42
LA-2666	S-36
LA-2696	S-10
LAMS-2642	S-36
LAMS-2692	S-36
LAMS-2720	S-42
LAMS-2722	S-42
LL TR-123	S-50
LMSD-288 233	S-34
ML-800	S-19
MND-2584	S-48
MND-M3A-2450	S-42
MSRP RR-64	S-50
NAA-SR-6585	S-39
NAS-NS-3106	S-37
NASA N62-11221	S-11
NASA N62-12169	S-47
NASA N62-12353	S-30
NASA N62-12436	S-11
NASA N62-12439	S-29
NASA N62-12450	S-19
NASA N62-12452	S-19
NASA N62-12453	S-21
NASA N62-12460	S-30
NASA N62-12464	S-46
NASA N62-12467	S-24
NASA N62-12469	S-31
NASA N62-12470	S-49
NASA N62-12472	S-24
NASA N62-12473	S-49
NASA N62-12474	S-26
NASA N62-12477	S-29
NASA N62-12497	S-1
NASA N62-12500	S-24
NASA N62-12501	S-24
NASA N62-12502	S-24
NASA N62-12529	S-21
NASA N62-12539	S-11
NASA N62-12553	S-28
NASA N62-12597	S-24
NASA N62-12598	S-19
NASA N62-12906	S-24
NASA N62-12913	S-36
NAVDOCKS P-701	S-12
NAVWEPS-5064	S-24
NAVWEPS-7608	S-8
NAVWEPS SSL-AA-03, rev. 1	S-16

Number	Page
NAVWEPS SSL-AG-61	S-16
NAVWEPS SSL-AQ-18	S-17
NAVWEPS SSL-AY-09	S-17
NAVWEPS SSL-AZ-07, rev. 1	S-16
NAVWEPS SSL-GA-03	S-17
NAVWEPS SSL-GD-03, rev. 1	S-16
NAVWEPS SSL-GF-02	S-16
NAVWEPS SSL-GG-04, rev. 1	S-17
NAVWEPS SSL-MP-03	S-16
NEL-952	S-50
NEL-978	S-19
NEL-1001	S-43
NM 000 018. 06. 07	S-4
NM 000 018. 11. 07	S-4
NM 006 012. 04. 100	S-6
NM 000 018. 11. 01	S-5
NM 000 018. 14. 01	S-4
NM 006 012. 04. 40	S-7
NM 006 012. 04-80	S-7
NM 006 012. 05. 03	S-6
NM 006 012. 04. 93	S-7
NM 007 081. 06. 12	S-7
NM 007 081. 11. 02	S-4
NM 007 081. 17. 02	S-3
NM 007 091. 11. 05	S-4
NOTS-1419	S-24
NOTS TP-2604	S-8
NP-5833	S-30
NYO-2482	S-43
NYO-9756	S-28
NYO-10086	S-48
NYO-10195	S-35
NYO-10289	S-10
ORNL-310	S-37
ORNL-3274	S-37
ORNL-TM-150	S-37
ORNL-TM-230	S-43
ORNL-TM-254	S-9
ORO-462	S-38
ORO-484	S-36
ORO-485	S-1
ORO-545	S-25
OSURF-483-7	S-50
OSURF-667-6	S-15
OSURF-696-1	S-2
OSURF-696-2	S-2
OSURF-1039-3	S-48
OSW Spec-241	S-14
OSW Spec-241, app. A-F	S-14
OSW Spec-241, Bid	S-14
PA TR-2102, add. 2	S-26
PB 139 761 see PB 160 647	S-12
PB 152 090	S-6
PB 155 238-2	S-19
PB 155 247	S-15
PB 157 295	S-15
PB 158 185	S-19
PB 160 052	S-3
PB 160 053	S-3
PB 160 054	S-3
PB 160 251	S-4
PB 160 252	S-4
PB 160 254	S-6
PB 160 255	S-5
PB 160 259	S-6
PB 160 263	S-7
PB 160 264	S-4
PB 160 286	S-3
PB 160 287	S-7
PB 160 288	S-7
PB 160 289	S-7
PB 160 290	S-4
PB 160 291	S-4
PB 160 516	S-31
PB 160 519	S-50
PB 160 520	S-19
PB 160 521	S-43
PB 160 576	S-33
PB 160 577	S-33
PB 160 578	S-48
PB 160 579	S-48
PB 160 580	S-17
PB 160 581	S-15
PB 160 583	S-45
PB 160 586	S-21
PB 160 587	S-21
PB 160 588	S-30
PB 160 588-S-1	S-30
PB 160 589	S-5
PB 160 590	S-5
PB 160 591	S-5
PB 160 592	S-20
PB 160 593	S-19
PB 160 594	S-23
PB 160 595	S-23
PB 160 596	S-23
PB 160 597-1	S-22
PB 160 597-2	S-22
PB 160 597-3	S-22
PB 160 598	S-23
PB 160 599	S-29
PB 160 600	S-30
PB 160 601	S-28
PB 160 602	S-20
PB 160 603	S-13
PB 160 604	S-24
PB 160 605	S-50
PB 160 606	S-8
PB 160 608	S-8
PB 160 609	S-34
PB 160 610	S-14
PB 160-611	S-44
PB 160 612	S-26
PB 160 614	S-49
PB 160 616	S-31
PB 160 617	S-35
PB 160 618	S-17
PB 160 619	S-29
PB 160 620	S-9
PB 160 621	S-50
PB 160 622	S-26
PB 160 623	S-47
PB 160 624	S-22
PB 160 625	S-47
PB 160 626	S-47
PB 160 627	S-47
PB 160 628	S-49
PB 160 629	S-17
PB 160 630	S-16
PB 160 631	S-50
PB 160 632	S-49
PB 160 634	S-31
PB 160 635	S-18
PB 160 636	S-9
PB 160 637	S-30
PB 160 638	S-20
PB 160 639	S-20
PB 160 640	S-2
PB 160 641	S-32
PB 160 642	S-18
PB 160 643	S-27
PB 160 644	S-2
PB 160 645	S-25
PB 160 646	S-2
PB 160 647	S-12
PB 160 648	S-12
PB 160 649	S-22
PB 160 651	S-2
PB 160 652	S-2
PB 160 653	S-2
PB 160 654	S-26
PB 160 655	S-15
PB 160 656	S-18
PB 160 658-1	S-25
PB 160 658-2	S-25
PB 160 659	S-13
PB 160 660	S-13
PB 160 661-1	S-14
PB 160 661-2	S-14
PB 160 661-3	S-14
PB 181 075	S-51
PB 181 295	S-27
PB 181 326	S-16
PB 181 327	S-16
PB 181 328	S-17
PB 181 329	S-16
PB 181 330	S-17
PB 181 331	S-17
PB 181 332	S-16
PB 181 333	S-16
PB 181 334	S-16
PB 181 335	S-17
PB 181 336	S-12
PHS Pub-910	S-51
PNE-106P	S-42
PNE-126P	S-44
PNE-127P	S-25
PWAC-165	S-26
RADC-TN-57-152	S-2
REP-268	S-40
RME-4511	S-11
RME-4517	S-11
RME-4521	S-11
RME-4540 (Rev.)	S-11
RME-4568	S-11
SACM-355-1	S-25
SACR-355-1, annex 4, c. 1 superseded	S-25
SACR-355-1, annex 4, c. 2 superseded	S-25
SC-4690(RR)	S-38
SCC-5	S-20
SCC-9	S-20
SCNC-264	S-44
SCR-487	S-30
SCTM-41-62(73)	S-25
SCTM-326-61(14)	S-38
SCTM-335-61(71)	S-31
SCTM-352-61(73)	S-31
SCTM-355-61(14)	S-20
SCTM-371-61(71)	S-30
SEL-62-018	S-20
SIO Ref-57-45	S-47
SIO Ref-57-51	S-47
SIT (DL)-438	S-31
SRI-876-1	S-25
SRI PU-876-2	S-25
SUI-61-6	S-45
SUI-61-7	S-45
SUI-61-21	S-36
SUI-61-22	S-36
TEI-780	S-11
TID-3911	S-47
TID-5231	S-34
TID-7025(Vol. 1)	S-42
TID-7025(Vol. 2)	S-42
TID-7025(Vol. 3)	S-42
TID-7616	S-8
TID-7623	S-39
TID-7628	S-46
TID-7629	S-8
TID-13023	S-3
TID-13719	S-38
TID-14001	S-48
TID-14095	S-1
TID-14201	S-6
TID-14223	S-36
TID-14258	S-37
TID-14260	S-8
TID-14308	S-6
TID-14329	S-8
TID-14390	S-12
TID-14423	S-37
TID-14424	S-45
TID-14429	S-48
TID-14476	S-1
TID-14570	S-42
TID-14631	S-33
TID-14693	S-48
TID-14772	S-12
TID-14773	S-33
TID-14778	S-8
TID-14786	S-39
TID-14811	S-34
TID-14821	S-36
TID-14827	S-35
TID-14828	S-6
TID-14830	S-35
TID-14831	S-8
TID-14844	S-39
TID-14942	S-44
TID-14853	S-49
TID-14956	S-9
TID-14970	S-8
TID-14977	S-20
TID-14978	S-39
TID-14984	S-48
TID-15012	S-42
TID-15046	S-6
TID-15054	S-39
TID-15075	S-8
TID-15145	S-32
TID-15228	S-28
TID-15244	S-15
TID-15245	S-21
TID-15246	S-12
TID-15247	S-26
TID-15262	S-36
TID-15337	S-43
TID-15373	S-42
TID-15391	S-28
TID-15398	S-45
TID-15399	S-49
TID-15403	S-27
TID-15421	S-9
TID-15422	S-38
TID-15429	S-42
TID-15430	S-38
TID-15619	S-40
TID-15621	S-33
TID-15622	S-12
TID-15638	S-44
TID-15639	S-37
TID-15682	S-47
TID-15685	S-7
TID-15688	S-37
TID-15691	S-38
TID-15692	S-37
TID-15693	S-37
TID-15694	S-49
TID-15695	S-38
TID-15696	S-37
TID-15697	S-7
TID-15698	S-37
TID-15699	S-37
TID-15700	S-47
TID-15701	S-38
TID-15702	S-45
TID-15706	S-37
TID-15733	S-14
TID-15789	S-18
TID-15915	S-46
TID-15963	S-3
TID-15973	S-46
TID-15975	S-14
TID-15986	S-27
TID-15987	S-27
TID-15988	S-27
TID-16019	S-27
TID-16111	S-48
TIM-435	S-34
TIM-438	S-44
TIM-483	S-43
TIM-490	S-34
TIM-499	S-43
TIM-554	S-43
TIM-612	S-31
TIM-615	S-31
TRW ETM-477	S-20
UCLA-503	S-4
UCRL-5973-T	S-42
UCRL-9875(Vol. II)	S-46
UCRL-10045	S-4
UCRL-10062	S-46
UCRL-10108	S-10
UCRL-10110	S-28
UCRL-10125	S-45
UCRL-10126	S-45
UCRL-10127	S-36
UCRL-10130	S-45
UNM-PR-EE-26	S-48
UR-575	S-8
USNRDL AD-234(H)	S-45
WADC-TN-57-23	S-13
WADC-TN-57-177	S-17
WADC-TN-58-346	S-22
WADC-TN-59-415	S-44
WAL-143/41-1	S-32
WAL-760/452-21	S-23
WAL-760/452-26	S-23
WAPD-BT-25	S-39
WAPD-MRP-97	S-40
WAPD-PWR-TE-79	S-40
WAPD-T-1464	S-34
WAPD-TM-258	S-28
WAPD-TM-273	S-34
WAPD-TM-320	S-34
WCAP-1874	S-38
WCAP-1929	S-38
WRL-415FD438-R5	S-20
WRL-908-113-P1	S-46
WT-1453	S-25
WT-1485	S-25
XDC-59-10-19	S-35
XDC-60-1-141	S-35
XDC-60-2-76	S-35
XDC-60-2-116	S-26
XDC-60-3-211	S-41
XDC-60-11-164	S-45
XDC-60-12-156	S-40
XDC-61-5-67	S-8
XDCL-59-12-719	S-40
XDCL-60-5-131	S-27
Y-1393	S-46

SUBJECT INDEX

Subject	Page	Number
103-A (Inductors)	S-16	PB 181 329
260-A (Q meter)	S-16	PB 181 329
Accidents	S-25	PB 160 645
Acrylic resins	S-14	PB 160 610
Adenosine phosphates	S-4	PB 160 252
Aerial photographs	S-2	PB 160 640
		PB 160 646
Aerial photography	S-10	GPO I 19.16: 450-B
Aerial reconnaissance	S-2	PB 160 640
		PB 160 646
Aerodynamics	S-30	PB 160 588
		PB 160 588-S-1
Air traffic control systems	S-13	PB 160 659
		PB 160 560
Air traffic controllers	S-13	PB 160 659
Airfoils	S-30	PB 160 588
		PB 160 588-S-1
Airport control towers	S-13	PB 160 660
Amplifiers	S-17	PB 181 328
	S-18	PB 160 656
AN/URC-9(XN-1)X Radio set)	S-50	AD-258 365
AN/USM-27 (Signal generator)	S-16	PB 181 332
Analog-to-digital converters	S-28	PB 160 601
Anchors	S-12	PB 160 648
Antenna radiation patterns	S-15	PB 160 655
Astronomical data	S-1	GPO D 213. 8/3:965
Atmosphere	S-47	PB 160 627
Atomic bomb explosions	S-36	GPO Y 3.At7: W37/962/ comp.
	S-45	PB 160 583
Audio level indicator	S-16	PB 181 327
Avalanches	S-11	GPO I 19.16: 378-B
BA-5 (Attenuation calibrators)	S-17	PB 181 328
Backward-wave amplifiers	S-18	PB 160 656
Backward-wave oscillators	S-19	PB 158 185
Ballistics	S-21	PB 160 586
Barium compounds	S-47	PB 160 623
Beam power tubes	S-19	PB 160 593
Behavior	S-2	PB 160 644
Beryllium	S-34	PB 160 609
Beryllium alloys	S-34	PB 160 609
Bibliography	S-22	PB 160 597-1
	S-23	PB 160 594
	S-43	PB 160 521
Blast	S-29	PB 160 619
Blood pressure	S-3	PB 160 052
		PB 160 053
Bodies of revolution	S-21	PB 160 587
Boiling	S-49	PB 160 632
Bone	S-7	PB 160 289
Boron	S-27	PB 160 643
C-2384(XN-1)/URC (Radio set control)	S-50	AD-258 365
Calcium	S-14	PB 160 610
Camera tubes	S-20	PB 160 592
Capcoder	S-28	PB 160 601
Carbohydrates	S-3	PB 160 054
Chlorides	S-3	PB 160 286
Circulatory system	S-3	PB 160 052
Coaxial cables	S-20	PB 160 602
Coils	S-16	PB 181 329
Combat	S-22	PB 160 624
Combustion	S-27	PB 160 643
Computers	S-36	GPO Y 3.At7: 2W37/962/ comp.
Conferences	S-11	GPO NAS 1.2: M56
Control systems	S-19	PB 155 238-2
	S-22	PB 160 649
Copper	S-22	PB 160 597-1
		PB 160 597-3
	S-23	PB 160 596
Cryogenics	S-49	PB 160 628
Culture	S-50	PB 160 631
Cyclotrons	S-19	PB 158 185
	S-35	PB 160 617
Data processing systems	S-10	GPO I 28.27: 8099
Deformation	S-11	GPO I 19.16: 378-B
Desalination	S-14	PB 160 661-1
		PB 160 661-2
		PB 160 661-3
Detectors	S-49	PB 160 632
Diet	S-3	PB 160 054
Diffraction	S-49	PB 160 614
Digestive system	S-7	PB 160 263
Diodes	S-15	PB 155 247
		PB 157 295
Dose rate	S-45	PB 160 583
Dozoku	S-50	PB 160 631
Earth	S-25	PB 160 658-1
		PB 160 658-2
Earthquakes	S-11	GPO I 19.16: 378-B
Ebicon tubes	S-20	PB 160 592
Electric connectors	S-20	PB 160 602
Electric power production	S-15	PB 160 581
	S-17	PB 160 580
	S-33	PB 160 576
	S-48	PB 160 579
Electrical double layer	S-9	PB 160 620
		PB 160 636
Electrodes	S-20	PB 160 638
		PB 160 639
Electron beams	S-16	PB 160 630
Electron tubes	S-18	PB 160 656
Electronic circuits	S-50	PB 160 519
Electronic equipment	S-17	PB 160 618
	S-43	PB 160 521
Electronics	S-20	AD-274 617
Electrons	S-46	AD-274 635
Engineering	S-12	PB 160 647
Entropy	S-10	GPO I 19.16: 500-A
Enzymes	S-5	PB 160 255
	S-6	PB 160 254
Explosions	S-25	PB 160 658-1
		PB 160 658-2
Finishes	S-27	PB 181 295
Flame spraying	S-26	PB 160 622
Flame thrower fuels	S-13	AD-258 291
Fluid flow	S-9	GPO I 19.16: 411-C
Fluorides	S-9	PB 160 636
Foamed metals	S-12	PB 181 336
Forestry	S-5	PB 160 590
		PB 160 591
Frequency meters	S-16	PB 181 326
	S-17	PB 181 331
Friction	S-22	PB 160 597-1
		PB 160 597-2
		PB 160 597-3
	S-23	PB 160 594
		PB 160 595
		PB 160 596
		PB 160 598
Fuel cells	S-18	PB 160 642
	S-20	PB 160 638
		PB 160 639
Gages	S-25	PB 160 658-1
		PB 160 658-2
Gallium	S-7	PB 160 289
Generators	S-17	PB 160 629
Geology	S-10	GPO I 19.16: 450-B
		GPO I 19.16: 500-A
Glutathione	S-4	PB 160 290
		PB 160 291
Graphite moderated reactors	S-43	PB 160 521
Group dynamics	S-50	PB 160 631
Guided missiles	S-21	PB 160 586
		PB 160 587
	S-24	PB 160 604
Gyroscopes	S-22	PB 160 649
Hall effect	S-17	PB 160 629
Handbooks	S-12	PB 160 647
Heart	S-3	PB 160 053
Heat transfer	S-22	PB 160 597-2
	S-23	PB 160 598
	S-49	PB 160 632
Helical antennas	S-15	PB 160 655
Hemispherical shells	S-29	PB 160 599
Hemorrhage	S-7	PB 160 287
Heterogeneous reactors	S-43	PB 160 521
Histamines	S-3	PB 160 286
Homogeneous reactors	S-43	PB 160 521
	S-44	PB 160 611
Honeycomb cores	S-12	PB 181 336
Human engineering	S-2	PB 160 651
		PB 160 652
		PB 160 653
	S-13	PB 160 659
		PB 160 660
Hydro-skis	S-13	PB 160 603
Hydrodynamics	S-31	PB 160 634
Hydrofoils	S-31	PB 160 634
Hydrogen	S-46	AD-274 635
Hydrogen compounds	S-18	PB 160 635
Hydrology	S-10	GPO I 19.16: 450-B
		GPO I 19.16: 500-A
Hydrolysis	S-4	PB 160 251
	S-8	PB 160 606
Iconoscopes	S-20	PB 160 592
Igniters	S-13	AD-258 291
Industrial equipment	S-26	GPO C 41. 2W45/2
Industry	S-10	GPO I 28.27: 8099
Information theory	S-2	PB 160 651
		PB 160 652
		PB 160 653
Infrared spectroscopy	S-20	AD-274 617
Inland waterways	S-10	GPO I 19.16: 500-A
	S-12	GPO I 19.13: 1711
Iron	S-10	GPO I 19.13-1459-I
Instruction manuals	S-25	PB 160 645
Invariance principles	S-47	PB 160 625
		PB 160 626
Jacks (Electricity)	S-20	PB 160 602
Jet engine fuels	S-27	PB 160 643
Klystrons	S-17	PB 181 335
Laminar boundary layer	S-30	PB 160 600
Landing gear	S-13	PB 160 603
Lasers	S-20	AD-274 617
Libraries	S-51	GPO FS 2.209: B52
		GPO Y 4.R86/ 2:D44
Light transmission	S-47	PB 160 625
		PB 160 626
Lighting systems	S-19	PB 160 520
Liquids	S-9	GPO I 19.16: 411-C
Maintenance	S-12	PB 160 647
Management engineering	S-50	PB 160 621
Mapping	S-10	GPO I 19.16: 450-B
Masers	S-20	AD-274 617
Mass spectrometers	S-35	PB 160 617
Medical personnel	S-2	PB 160 644
Medicine	S-51	GPO FS 2.209: B52
Metallurgy	S-32	GPO I 28.37/a: M564/961
Metals	S-32	PB 160 641
Membranes	S-30	PB 160 637
Mercury	S-9	PB 160 636
Meteorology	S-11	GPO NAS 1.2: M56
MI 200A (Amplifier)	S-16	PB 181 333
Microwave amplifiers	S-20	AD-274 617
Microwave equipment	S-15	PB 155 247
		PB 157 295
	S-18	PB 160 656
Microwave oscillators	S-19	PB 158 185
	S-20	AD-274 617
Microwaves	S-17	PB 181 335
Military intelligence	S-22	PB 160 624
Military personnel	S-2	PB 160 640
		PB 160 646
Minerals	S-10	GPO I 28.27: 8099
Mississippi River	S-12	GPO I 19.13: 1708
		GPO I 19.13: 1711
Moisture	S-10	GPO I 19.13: 1619-U
Moistureproofing	S-27	PB 181 295
MOLE project	S-25	PB 160 658-1
		PB 160 658-2

Subject	Page	Number
Molybdenum	S-31	PB 160 616
Moon	S-1	GPO NAS 1.2: Sp1/4/962
Mooring	S-12	PB 160 648
Muscles	S-4	PB 160 251
Myosin	S-5	PB 160 255
Naval communications	S-50	AD-258 365
		PB 160 519
Naval mine warfare	S-24	GPO D 217.2: M66
Naval mines	S-24	GPO D 217.2: M66
Naval research	S-51	PB 181 075
Neutrons	S-47	PB 160 625
Night photography	S-20	PB 160 592
Nitrogen	S-46	AD-274 635
Nitroglycerin	S-8	PB 160 606
Nonlinear systems	S-19	PB 155 238-2
Nuclear explosions	S-25	PB 160 658-1
		PB 160 658-2
	S-35	GPO Y 3.At7: 2W37/962
Nuclear weapons	S-25	PB 160 645
	S-35	GPO Y 3.At7: 2W37/962
	S-36	GPO Y 3.At7: 2W37/962/ comp.
Nucleotides	S-5	PB 160 255
OAP(Wavemeter-oscillator)	S-17	PB 181 331
Ogeechee River	S-12	GPO I 19.13: 1704
Omegatron	S-30	PB 160 617
Opthalmology	S-2	PB 160 640
		PB 160 646
Optical images	S-47	PB 160 627
Optics	S-47	PB 160 625
		PB 160 626
		PB 160 627
Ordnance steel	S-22	PB 160 597-1
		PB 160 597-2
		PB 160 597-3
	S-23	PB 160 595
		PB 160 596
		PB 160 598
Oscillators	S-17	PB 181 331
Oxides	S-48	PB 160 578
Oxygen electrodes	S-18	PB 160 635
Pearl River	S-12	GPO I 19.13: 1704
Pectins	S-4	PB 160 264
Peroxides	S-18	PB 160 635
Phosphoric acids	S-4	PB 160 251
Photoelastic materials	S-49	PB 160 614
Photographic analysis	S-2	PB 160 640
		PB 160 646
Phototubes	S-20	PB 160 592
Plants	S-10	GPO I 19.13-1459-1
Plasma physics	S-16	PB 160 630
Plasma substitutes	S-4	PB 160 264
Plasticity	S-11	GPO I 19.16: 378-B
Plastics	S-26	PB 160 612
Plugs (Electricity)	S-20	PB 160 602
Ponderosa Pine	S-5	PB 160 589
Porous materials	S-9	GPO I 19.16: 411-C
Potassium compounds	S-3	PB 160 286
Potassium tolerance	S-4	PB 160 290
		PB 160 291
Power amplifiers	S-16	PB 181 333
Power supplies	S-17	PB 181 335
	S-20	PB 160 638
		PB 160 639
Pressure gages	S-16	PB 181 334
Pressurized water reactors	S-43	PB 160 521
Primary batteries	S-18	PB 160 635
Probability	S-11	GPO I 19.16: 378-B
	S-50	PB 160 621
Proteins	S-3	PB 160 054
Public works	S-12	PB 160 647
Pulse generators	S-16	PB 181 332
Pumps	S-49	PB 160 628
Q meters	S-16	PB 181 329
Quantum mechanics	S-20	AD-274 617
	S-46	AD-274 635
Quarpel	S-27	PB 181 295
Radar echo areas	S-50	PB 160 605
Radar reflections	S-50	PB 160 605
Radar signals	S-50	PB 160 605
Radiation damage	S-43	PB 160 521
Radiation effects	S-6	PB 160 254
Radiation injuries	S-7	PB 160 263
		PB 160 287
		PB 160 288
	S-35	GPO Y 3.At7: 2W37/962
Radiation instruments	S-38	GPO C 41.2: N88
Radiation sickness	S-6	PB 160 259
Radiative transfer	S-47	PB 160 625
		PB 160 626
Radio communication systems	S-50	AD-258 365
Radio equipment	S-50	AD-258 365
Radio receivers	S-50	PB 160 519
Radioactive fall-out	S-35	GPO Y 3.At7: 2W37/962
Radioactive isotopes	S-7	PB 160 289
Radioactivity	S-45	PB 160 583
Radiobiology	S-7	PB 160 263
Radiological dosage	S-6	PB 160 259
Rare earths	S-33	PB 160 576
		PB 160 577
Reaction time	S-2	PB 160 640
		PB 160 646
		PB 160 653
Reactor moderators	S-44	PB 160 611
Reasoning	S-2	PB 160 644
Refractory materials	S-26	PB 160 622
	S-31	PB 160 616
	S-47	PB 160 623
Reliability	S-17	PB 160 618
Resonance absorption	S-35	PB 160 617
Rhenium compounds	S-8	PB 160 608
Rocket fuels	S-26	PB 160 654
Rocket motor nozzles	S-26	PB 160 622
Rocket motors	S-26	PB 160 654
Rocket oxidizers	S-26	PB 160 654
Rocket propellants	S-26	PB 160 654
Rockets	S-24	PB 160 604
Rotating bands	S-23	PB 160 595
		PB 160 596
Safety	S-25	PB 160 645
Salivary glands	S-6	PB 160 254
Sandwich construction	S-12	PB 181 336
Sandwich panels	S-12	PB 181 336
Satellite vehicle research	S-11	GPO NAS 1.2: M56
Satellite vehicles	S-22	PB 160 649
Scheduling	S-50	PB 160 621
Scientific research	S-20	AD-274 617
	S-51	PB 181 075
Sea water	S-14	PB 160 661-1
		PB 160 661-2
		PB 160 661-3
Semiconductors	S-15	PB 155 247
		PB 157 295
	S-17	PB 160 580
	S-20	AD-274 617
	S-48	PB 160 579
Serials	S-51	GPO FS 2.209: B52
Signal generators	S-16	PB 181 332
Signals	S-17	PB 181 335
Silicides	S-8	PB 160 608
Silicon compounds	S-26	PB 160 622
Ski landing gear	S-13	PB 160 603
Sky brightness	S-47	PB 160 627
Sliding friction	S-22	PB 160 597-1
		PB 160 597-2
		PB 160 597-3
	S-23	PB 160 594
		PB 160 595
		PB 160 596
Slot antennas	S-15	PB 160 655
Sodium compounds	S-8	PB 160 606
	S-9	PB 160 636
	S-48	PB 160 578
Soils	S-10	GPO I 19.13: 1619-U
	S-14	PB 160 610
Solar systems	S-1	GPO NAS 1.2: Sp1/4/962
Solid state physics	S-20	AD-274 617
Solids	S-49	PB 160 614
Sounding rockets	S-24	PB 160 604
Space flight	S-1	GPO NAS 1.2: Sp1/4/962
Spaceships	S-1	GPO NAS 1.2: Sp1/4/962
	S-22	PB 160 649
	S-7	PB 160 288
Spleen extract	S-18	PB 152 090
Spores		
Starvation	S-3	PB 160 052
		PB 160 053
		PB 160 054
Statistical functions	S-50	PB 160 621
Statistical tests	S-17	PB 160 618
Stress (Physiology)	S-3	PB 160 052
		PB 160 053
		PB 160 054
Structures	S-29	PB 160 619
Symposia	S-16	PB 160 630
Tables	S-30	PB 160 588
		PB 160 588-S-1
Tantalum	S-31	PB 160 616
Target recognition	S-2	PB 160 640
		PB 160 646
Targets	S-2	PB 160 640
		PB 160 646
Test equipment	S-23	PB 160 595
Test reactors	S-43	PB 160 521
Test sets	S-17	PB 181 330
	S-50	AD-258 365
Tetrodes	S-19	PB 160 593
Textiles	S-27	PB 181 295
Thermal radiation	S-35	GPO Y 3.At7: 2W37/962
Thermodynamics	S-9	PB 160 636
Thermoelectricity	S-15	PB 160 581
	S-17	PB 160 580
	S-33	PB 160 576
		PB 160 577
	S-48	PB 160 578
		PB 160 579
Thorium compounds	S-47	PB 160 623
Tiros	S-11	GPO NAS 1.2: M56
Transistors	S-17	PB 181 330
Transmitter receivers	S-50	AD-258 365
Transport theory	S-47	PB 160 625
Trees	S-5	PB 160 589
		PB 160 590
		PB 160 591
TS-1100/U (Transistor set)	S-17	PB 181 330
Tuned amplifiers	S-16	PB 181 327
	S-17	PB 181 328
Tungsten	S-31	PB 160 616
Turbulent boundary layer	S-30	PB 160 600
Ultrasonics	S-32	PB 160 641
Underground explosions	S-25	PB 160 658-1
		PB 160 658-2
Undersea warfare	S-24	GPO D 217.2: M56
Underwater ordnance	S-24	GPO D 217.2: M66
Urethanes	S-12	PB 181 336
Vanadium compounds	S-48	PB 160 578
Varactor diodes	S-15	PB 157 295
Vibration	S-30	PB 160 637
	S-32	PB 160 641
Visual perception	S-2	PB 160 640
		PB 160 646
		PB 160 651
		PB 160 652
Voltmeters	S-16	PB 181 327
Water	S-10	GPO I 19.13-1459-1
Water boiler reactors	S-43	PB 160 521
Water supplies	S-12	GPO I 19.13: 1702
		GPO I 19.13: 1704
		GPO I 19.13: 1708
		GPO I 19.13: 1711
Water waves	S-31	PB 160 516
Wave analysis	S-49	PB 160 614
Wavemeters	S-17	PB 181 331
Weapons	S-24	GPO D 217.2: M66
Welding	S-26	GPO C 41. 2W45/2
Wood	S-5	PB 160 591
X-rays	S-6	PB 160 254
		PB 160 259
	S-7	PB 160 288
Yaw	S-21	PB 160 586
YC-123 aircraft	S-13	PB 160 603

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